TAKUMA

CSR Report 2018

Bringing new value to society with +TAKUMA

Founder Tsunekichi Takuma invented the first boiler to be produced entirely in Japan by bringing expertise and technology to a product that had to be imported until that time.

By passing down this philosophy over time and augmenting it with Takuma's technology, we continue to create products with new value today.

Going forward, we will provide that value to customers through plants that take advantage of the proprietary technologies we have developed since our founding in areas such as combustion, waste treatment, and water treatment.

Contents

Message from Top Management

We are working to achieve sustained growth together with society through the policies outlined by our new Medium-Term Management Plan.

In the corporate vision adopted in 2012, the Takuma Group embraced the goal of continuing to play an essential role for society as a leading company in the utilization of renewable energy and in the field of environmental protection and of achieving ordinary profit of JPY 10.0 billion in FY2020. Under our 11th Medium-Term Management Plan (FY2015 to FY2017), which identified the realization of sustained growth as a top priority, we worked to expand our businesses in terms of both quality and quantity in order to achieve that corporate vision through the six policies set forth in the plan, including maintaining and expanding our market position in the EPC* business and expanding businesses that generate base profits.

In our EPC business, we firmly harnessed robust demand to drive orders, allowing us to secure a certain position in the various markets we serve while building a foothold to expand that position by capturing orders for multiple large biomass power plants and sludge-fueled power plants. In businesses that generate base profits, we pursued initiatives to expand those profits in an effort to maintain and increase profitability, for example by developing a business foundation and strengthening our maintenance capabilities. As the result of these initiatives, we were able to steadily expand our business in terms of both quality and quantity, and to achieve our targets for consolidated order value and consolidated ordinary profit under our quantitative plan.

*EPC business: A business in which Takuma offers turnkey service extending from plant design to procurement and construction.

About the new Medium-Term Management Plan

This April, the Group embarked on the 12th Medium-Term Management Plan (FY2018 to FY2020), which embodies the final stage of its current medium- and long-term vision (corporate vision). Although we expect demand to remain robust during the years covered by the plan, we also anticipate that the business environment will undergo major changes as Japanese policy and social structure continue to evolve over the medium and long term. The plan identifies five policies to boost the Group's strength so that we can achieve our corporate vision and subsequently realize steady growth in light of the future changes we expect to see in the business environment.

The first policy is to strengthen and expand our revenue foundation. The Group's products—that is, waste treatment plants, water treatment plants, and boiler plants—serve as social infrastructure and as a base for companies' business activities. Most products remain in use for a long time following their delivery to customers, often 20 or 30 years, and our ability to provide sustained, high-quality after-sales service to ensure that those products function longer and more effectively contributes to our customers' profits as well as our own, providing a basis for stable, long-term profits. By supplying high-quality solutions throughout the plant and product life cycle in order to precisely meet customers' diversifying needs, we will work to further strengthen and enhance our revenue base.

The second policy is to achieve sustained growth. Over the approximately 80 years since its founding, the Group has supplied products built around a core of technology that have earned recognition for their high value, giving it an essential role in society. Drawing on strengths including the technology, track record, experience, and expertise accumulated through our business activities to date, we will achieve sustained growth by continuing to develop unique technologies, services, and business models; creating value for customers; and securing and creating competitive advantages by rapidly accommodating changes in the business environment, for example in the form of evolving needs and the emergence of new social issues.

The third policy is to increase productivity, for example by reforming business processes. The Group's businesses are changing dramatically in response to changes in the business environment, including structural changes such as the aging and shrinking of Japan's population and a tendency for customers' needs and social issues to become more sophisticated and diverse. To address these changes, we will seek to more effectively utilize human resources and to provide higher value to customers by boosting productivity by radically reviewing and rebuilding business processes that have become more complex and focusing on higher-added-value operations.

The fourth policy is to use human resources more effectively. In addition to hiring and training the more diverse workforce that will be essential for the future development of our businesses, we will work to put in place an environment that allows each and every employee to do their jobs in an energetic and engaged manner so that they can take full advantage of their skills and abilities.

The fifth policy is to continue to pursue compliance management. The Group has consistently considered compliance to be a key basis for corporate activities, and the last several Medium-Term Business Plans have included policies that address this area in an effort to ensure the penetration and implementation of associated measures. A sustained program of awareness-raising and educational activities has helped compliance awareness to take root throughout our organization, and we will continue to pursue improvements so the trust that our quality and other accomplishments inspires will remain unshaken. In addition, we will work to ensure that enhanced awareness of the importance of compliance permeates the company even more deeply by effectively implementing and utilizing mechanisms such as our in-house reporting system and CSR awareness questionnaire survey.

Responsible corporate management

Through the current Medium-Term Management Plan the Group is working to build business and management platforms that will be resistant to future changes in the business environment. In order for us to achieve those priorities, I believe that it will be important for us to live up to the trust placed in us by all stakeholders, including customers, shareholders and investors, business partners, employees, and local communities, in a spirit of good faith. To that end, we will work aggressively to implement corporate governance, compliance, and risk management in a way that serves as a basis for our corporate activities going forward.

Message from Top Management

Achieving sustained growth together with society

Takuma has been a signatory to the United Nations Global Compact since 2006, and we support its 10 fundamental principles in the 4 areas of human rights, labour, environment, and anti-corruption. We will work to develop our business while understanding and respecting these globally shared principles. In addition, concerning the implementation of the Sustainable Development Goals (SDGs) adopted by the United Nations and the provisions of the Paris Agreement adopted at COP21, the Group is helping resolve social issues with technologies for reducing emissions of the greenhouse gas carbon dioxide through high-efficiency generation of electricity using waste and biomass.

WE SUPPORT UN GLOBAL COMPACT

The Takuma Group has joined the United Nations Global Compact (UNGC), which is a voluntary effort to create a global framework for implementing sustainable growth by having companies and groups exercise responsible and creative leadership while acting as good members of society.
Reference: UN Global Compact
http://www.unglobalcompact.org/

In closing, in compiling this CSR Report we have sought not only to provide a resource by means of which a broad range of stakeholders could learn more about the Takuma Group's activities, but also to help each and every Group employee think carefully about CSR and bring that perspective to bear in his or her work. We at the Takuma Group encourage readers to offer their candid views and advice, which we will carefully review in order that we might better resolve social issues and contribute to the sustained development of society.

July 2018

Takaaki Kato
President and CEO
Takuma Co., Ltd.

Takaaki Kato

+ Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) are a series of international goals covering the time period of 2016 to 2030 as described in "Transforming Our World: The 2030 Agenda for Sustainable Development," which was adopted at a UN summit in September 2015. The SDGs were intended to pick up where the Millennium Development Goals (MDGs), which were formulated in 2001, left off. They consist of 169 targets organized around 17 goals for achieving a sustainable world, built around the pledge of leaving no one behind. Intended to be implemented not only by developing nations, but also by advanced nations, they are universal in scope, and Japan is working actively to implement them.

Takuma, too, is working to further progress toward the SDGs through its business activities. (The "Introduction to Takuma's Businesses" section on pages 29 to 40 of this report includes icons representing the SDGs that are related to each business.)

+ Company Motto

Value Technology, Value People, Value the Earth

+ Management Principles

Takuma will strive for social contribution, corporate value enhancement, long-term corporate development and the satisfaction of all stakeholders by providing goods and services that are needed and recognized as valuable in society.

The founding spirit of Takuma was "Service to the nation through boiler manufacturing,"* which in present-day language means "contribution to society by supplying goods and services that we yield." This spirit can also be applied to the concept of Corporate Social Responsibility (CSR) that in recent years has become a vital issue for corporate management. The management principles of the Takuma group companies are all based on the said founding spirit.

* Service to the nation through boiler manufacturing
It was the Company Motto of Takuma, then Takuma Boiler Manufacturing Co., Ltd., founded by Mr. Tsunekichi Takuma, one of the ten great inventors of Japan during the Meiji and Taisho periods (1868–1926).

+ Takuma Group Ethics Charter

Takuma and the Takuma Group companies believe that it is essential for the sound development of the group that all of the directors and employees remain aware of our social responsibilities and the circumstances surrounding us as well as act in response to social ethics complying with applicable related laws and ordinances. Bearing the above in mind, we have established and will promote this ethics charter as our code of conduct, aiming to realize our management principles.

1. We shall strive for proactive social contribution while establishing a harmonious coexistence with the global environment as good corporate citizens.
2. We shall act in good faith in accordance with sound business custom, while complying with applicable laws and regulations and committing ourselves to fair, transparent and free competition, as well as conducting lawful business activities.
3. We shall never have any relationship with antisocial forces or organizations, which may pose a threat to the social order and security of civil society.
4. We shall respect fundamental human rights and never practice discrimination.
5. We shall strive to provide high quality products and services, based on our advanced technologies, to attain high acclaim and confidence from our customers.
6. We shall strive to disclose corporate information to shareholders and investors through investor relations (IR) and other activities on a timely and equitable basis.
7. We shall strive to protect corporate properties as well as information, while never using either for improprieties or any unjustifiable purpose other than normal business operations.

+ Takuma Group Code of Conduct

Harmony with society
1. Coexistence with the global environment
2. Coexistence with international society
3. Practice of social contribution activities

Practice of compliance with laws and ordinances as well as sound economic activities
4. Free competition and fair trade
5. Relationship with politics and public administration
6. Policies concerning business entertainment and gift-giving
7. Prohibition of involvement in anti-social activities
8. Appropriate export and import transactions

Respect for basic human rights
9. Prohibition of discriminatory actions
10. Respect for individuality, personal quality, and privacy
11. Safe work environment

Practice of customer satisfaction
12. Safety of products and services as well as ensuring reliability
13. Policies concerning advertising

Making appropriate disclosure of information
14. Transmission of corporate information
15. Ensuring reliability of financial reporting
16. Prohibition of insider trading

Protection of corporate properties and information
17. Management and proper use of corporate properties
18. Handling of confidential information
19. Intellectual property protection

1. Reflections on the 11th Medium-Term Management Plan

1 Initiatives to implement policies

+ Initiatives of the 11th Medium-Term Management Plan (2015 to 2017)

Theme

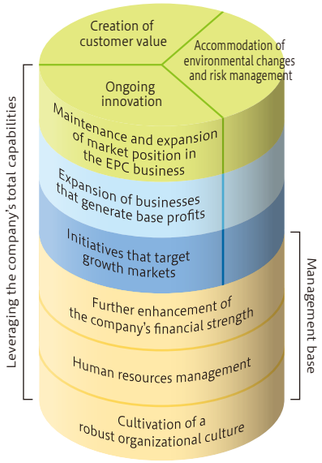
Build upon our previous results to further improve our business in terms of both quantity and quality in order to achieve sustained growth.

Policies

- Maintenance and expansion of market position in the EPC business
- Expansion of businesses that generate base profits
- Initiatives that target growth markets
- Further enhancement of the company's financial strength
- Human resources management
- Cultivation of a robust organizational culture

Perspectives

- Creation of customer value
- Ongoing innovation
- Accommodation of environmental changes and risk management



+ Results and issues

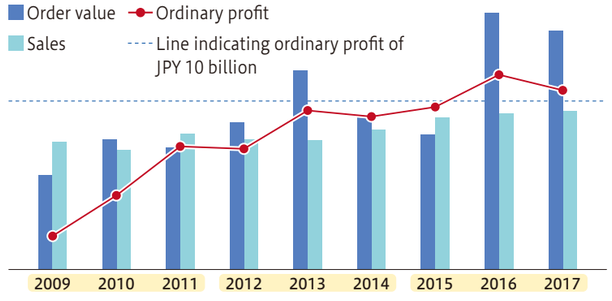
- In our EPC business, we established a certain position in the markets we serve by steadily harnessing robust demand to drive orders.
- We built a foothold to expand our presence by capturing orders for multiple large biomass power plants and sludge-fueled power plants.
- Businesses that generate base profits allowed us to generally achieve the profit targets outlined in the plan, contributing to stable consolidated earnings.
- Preparing a stage for overseas expansion and developing human resources continue to be important issues.
- We maintained a certain level of equity ratio thanks to continued profitability.
- Efforts to secure adequate manpower, for example through midcareer hires, as a way to accommodate growth in orders faced difficulty due to a shortage of workers. Tight labor conditions persisted.
- Compliance and CSR awareness spread throughout the Group thanks to ongoing initiatives.

Biomass Power Plant

Sewage Sludge-Fueled Power Plant

2 Quantitative results

- Business volume expanded steadily against a backdrop of robust demand. Order value significantly exceeded the plan, while the order backlog grew to the JPY 200 billion level.
- In terms of quality, we achieved the level of profit outlined in the plan and made smooth progress toward our goal of reaching ordinary profit of JPY 10 billion in FY2020.



(Billion JPY)

	9th Medium-Term Management Plan results (2009 to 2011)	10th Medium-Term Management Plan results (2012 to 2014)	11th Medium-Term Management Plan results				11th Medium-Term Management Plan targets
			2015	2016	2017	Total	
Order value	257.8	371.0	99.9	191.0	177.1	468.0	400.0
Sales	285.2	296.5	113.0	116.3	118.1	347.5	360.0
Ordinary profit	13.7	25.7	9.6	11.6	10.6	31.9	27.0
Order backlog	78.1	152.5	139.4	214.1	273.0	–	–

*Order backlog figures are provided for the last year of each Medium-Term Management Plan and for the end of each fiscal year.

2. Business Environment

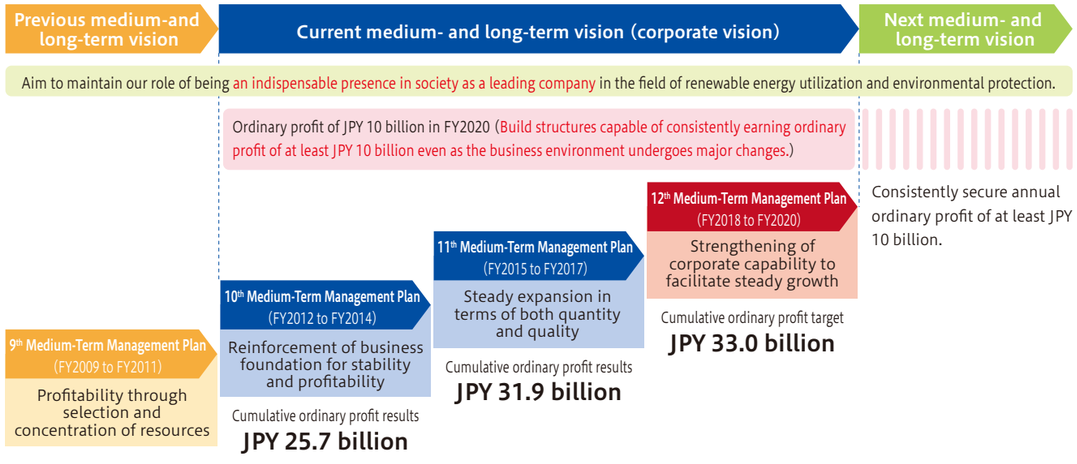
- We expect to see continued robust demand in the Group's principal business domains.
- At the same time, the business environment is expected to undergo major changes over the medium and long term, including changes in demand in response to evolving national policies and the structure of society, increased reliance on comprehensive contracts due to a trend to outsource government services, and increasing sophistication and diversity in customer needs.

	Current 3-year period (12th Medium-Term Management Plan)	Future (medium and long term)
Waste treatment plants (Japan)	• Renewal and service life elongation demand will continue as facilities age. • There will continue to be demand for more efficient energy use and additional functionality (development of disaster prevention and peripheral facilities, etc.). • Comprehensive contracts for plant operation, for example in the form of DBO and O&M arrangements, will become more common.	• Renewal and service life elongation demand will eventually fall off. • The market will contract due to the aging and shrinking of Japan's population. • The trend to outsource government services (by making use of the private sector) will gain momentum.
Water treatment plants (Japan)	• Renewal demand will increase as sewage treatment plants age. • Demand for converting sewage sludge into energy will grow. • PPP arrangement (that make use of the private sector) will be embraced by the sewer industry.	• Comprehensive contracts for plant construction and operation, such as PPP/PFI arrangements, will become more common. • There will continue to be demand for energy conservation, energy creation, and resource use.
Boiler plants (Japan)	• There will continue to be demand from FIT projects. • The number of plants targeted for maintenance will continue to grow as more plants come online. • Demand for plant operational management and O&M will grow.	• Demand for renewable energy will continue as society works to achieve a new energy mix by 2030. • Use of regional distributed biomass will continue. • There will continue to be a certain level of demand for renewal and fuel conversion of existing plants.
Boiler plants (overseas)	• Demand for biomass power plants in Southeast Asia will remain robust. • Our flagship bagasse-fired boiler plants will continue to face intense competition, especially from manufacturers in countries such as India and China.	• There will continue to be a certain level of demand against the backdrop of rich biomass resources. • Demand for using a variety of fuels such as EFB will grow.
Waste treatment plants (overseas)	• Demand for Waste to Energy will grow in Southeast Asia due to growing urbanization, and an increase in, and diversification of, waste. • Market development will be gradual due to institutional and financial issues, amongst others.	• The market will expand as economies grow.
Package boilers (general-purpose boilers)	• A certain level of demand will continue due to factors such as renewal demand even as the Japanese market matures. • Demand for energy-conserving boilers will grow overseas particularly in emerging nations.	• The Japanese market will contract due to the aging and shrinking of the country's population. • The market will expand further as emerging nations' economies grow.
Equipment and systems	• A certain level of demand will continue for both building equipment and semiconductor manufacturing equipment as construction demand rises and investment in the semiconductor industry expands.	• A certain level of demand will continue for both building equipment and semiconductor manufacturing equipment.

*DBO : Design Build Operate / O&M : Operation & Maintenance / PPP : Public Private Partnership / PFI : Private Finance Initiative / FIT : Feed-in Tariff / EFB : Empty Fruit Bunch

3. Positioning of the 12th Medium-Term Management Plan

- The plan represents the final stage of the current medium- and long-term vision (corporate vision), for which FY2020 is the target year.
- During its three years, we will achieve the vision and boost our corporate capabilities to prepare for steady growth in the future in response to future changes that are forecasted to occur in the business environment.



4. Policies of the 12th Medium-Term Management Plan

- By undertaking five new policies in line with the three perspectives continued from the 11th Medium-Term Management Plan, we will strengthen profitability and competitiveness while working to strengthen our management foundation, with a focus on effective use of human resources. In this way, we will strive to achieve our medium- and long-term vision while building a robust business and management foundation in response to future changes in the business environment.

1 Strengthening and expanding our revenue foundation

Many of the Group's products are used for a long period of time, for example for 20 or 30 years from the time of delivery. Offering high-quality after-sales service in an ongoing manner so that customers can use those products more effectively and over a longer period of time contributes to both customers' and the Group's profits, helping to create a foundation for stable, long-term earnings.

We will work to further strengthen and expand our revenue foundation by continuing to provide high-quality solutions throughout the plant and product life cycle as we meet customers' diversifying needs in an individualized manner.

2 Achieving sustained growth

Over the 80 years since the Group's founding, we have built a reputation as an essential part of society by providing products that are recognized for their value utilizing our technologies which are the core part of our company.

We will create customer value by continually developing unique technologies, services, and business models based on Takuma's strengths such as the technologies, track record, experience, and expertise that we've accumulated through our business activities to date. In addition, we will work to secure sustained growth by securing and creating competitive advantages as we respond quickly to changes in the business environment, such as evolving customer needs and emerging social issues.

3 Increasing productivity, for example by reforming business processes

The nature of the Group's businesses is undergoing major evolution as the business environment changes, for example due to changes in social structure such as the shrinking and aging of Japan's population and the emergence of more advanced and diverse customer needs as well as social issues.

We will strive to improve productivity, make effective use of human resources, and further increase the level of value we provide by fundamentally reviewing and rebuilding business processes that have become increasingly complex in order to accommodate these changes while focusing on businesses with higher added value (which will help us create and provide value).

4 Using human resources effectively

We will work to hire and train the diverse workforce that will be essential as we develop the Group's businesses going forward. At the same time, we will strive to create an environment that keeps individual employees engaged in their work and able to make full use of their skills and abilities (by cultivating a healthy workplace culture, reforming individual awareness, and facilitating fulfilling workstyles).

5 Continuing to pursue compliance management

The Group considers compliance to be a key foundation of its corporate activities, and we've worked to spread awareness and foster adoption of good practices by including compliance as a policy in the last several Medium-Term Management Plans.

Awareness of the importance of compliance has steadily taken root among our employees thanks to ongoing awareness-raising and educational activities, and we will continue to pursue such initiatives to ensure that the trust we've built up in our quality and integrity remains unshakable. In addition, we will work to further spread and improve compliance awareness throughout the Group by effectively implementing and utilizing mechanisms such as our internal reporting system and CSR awareness survey.

Policies

1. Strengthening and expanding our revenue foundation
2. Achieving sustained growth
3. Increasing productivity, for example by reforming business processes
4. Using human resources effectively
5. Continuing to pursue compliance management

Perspectives for achieving our policies

1 Creation of customer value

Strive to create new value from the customers' perspective and avoid price competition by working closely with, and developing a deep understanding of, customers.

2 Ongoing innovation

Achieve sustained differentiation by pursuing innovation in terms of both technologies and business models, and leverage that differentiation to create the value demanded by customers.

3 Accommodation of environmental changes and risk management

Adapt to changes of the business environment in which the company operates (e.g., changes in the economic climate, revisions to applicable laws, and changes in customer needs) and strengthen initiatives to treat such changes as business opportunities.

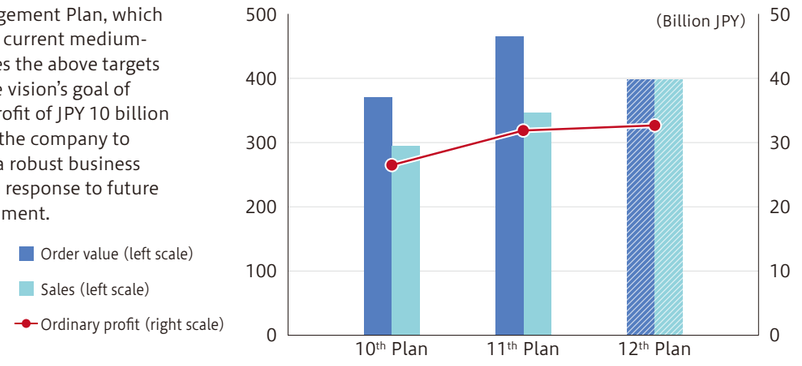
Achieving our vision

Building a business and management foundation that is resilient during change

5. Financial Target

+ Target: 3-year cumulative consolidated ordinary profit of JPY 33 billion

The 12th Medium-Term Management Plan, which represents the final stage of our current medium- and long-term vision, establishes the above targets to guide our achievement of the vision's goal of consistently earning ordinary profit of JPY 10 billion while simultaneously directing the company to utilize all its resources to build a robust business and management foundation in response to future changes in the business environment.



(Billion JPY)

	10th Medium-Term Management Plan results				11th Medium-Term Management Plan results				12th Medium-Term Management Plan
	2012	2013	2014	Total	2015	2016	2017	Total	FY2018 to FY2020
Order value	109.2	148.0	113.7	371.0	99.9	191.0	177.1	468.0	JPY 400 billion (approx.) (3-year cumulative total; reference value)
Sales	96.3	96.3	103.8	296.5	113.0	116.3	118.1	347.5	
Ordinary profit	7.1	9.4	9.1	25.7	9.6	11.6	10.6	31.9	**Target: JPY 33 billion (3-year cumulative total)**

6. Core Business Units and Emphasis of Future Activities

+ Municipal Solid Waste Treatment Plant Business

Business Environment

- As facilities age, there is ongoing robust demand for renewal and service life elongation.
- Volume is growing for DBO projects as well as O&M services for existing facilities.

Emphasis of Future Activities

- Strengthen the profitability of our plant operation business.
- Further strengthen initiatives to prolong the service life of facilities.

Waste-to-Energy Plant
(DBO Project)
Treatment capacity: 174 tons per day
Generating capacity: 3,800 kW

Waste-to-Energy Plant
(Primary equipment improvement project)
Treatment capacity: 810 tons per day
Generating capacity: 17,200 kW

+ Water Treatment Plant Business

Business Environment

- There is growing demand for sludge incineration plants that conserve and create energy.
- There is increasing use of PPP/PFI arrangements in the sewer business.

Emphasis of Future Activities

- Strengthen the competitiveness of our sludge-fueled power system.
- Scale our waste management expertise horizontally to other businesses.

Sludge-Fueled Power System
Demonstration Plant
Treatment capacity: 35 wet tons per day
(with moisture content of about 70%)
Generating output: About 100 kWh/h

Moving Bed Upflow Continuous
Sand Filtration System (high-speed)
Treatment capacity: 29,500 m^3 per day

+ Boiler Plant Business (Japan)

Business Environment

- FIT demand remains robust.
- The number of plants targeted for maintenance is increasing as facilities are completed and transferred to customers.
- There is growing demand for plant operational management and O&M.

Emphasis of Future Activities

- Capture new orders for FIT biomass plants.
- Strengthen our maintenance structures.
- Scale our waste management expertise horizontally to other businesses.

Wood Chip Biomass Power Plant
Generating capacity: 22,100 kW

Wood Chip Biomass Power Plant
Generating capacity: 1,990 kW

+ Boiler Plant Business (Overseas)

Business Environment

- Demand for biomass power plants in Southeast Asia remains robust.
- Our flagship bagasse-fired boiler plants continue to experience intense competition.

Emphasis of Future Activities

- Capture orders continually by creating competitive advantages.
- Strengthen the ability of our local subsidiary (SIAM TAKUMA) to carry out its business operations.

Bagasse-Fired Boiler Plant
(Thailand)

Bagasse-Fired Boiler Plant (Thailand)

+ Waste Treatment Plant Business (Overseas)

Business Environment

- There is a growing need for proper waste management and energy utilization against a backdrop of growing urbanization, increase of waste volume, and diversification of waste characteristics.

Emphasis of Future Activities

- Build structures to facilitate collaboration with partner companies.
- Build schemes for entering new markets.

Waste-to-Energy Plant (UK)
Treatment capacity: 1,370 tons per day
Generating capacity: 36,650 kW

Waste-to-Energy Plant (China)
Treatment capacity: 1,600 tons per day
Generating capacity: 30,000 kW

+ Package Boiler Business

Business Environment

- We are continuing to see a certain level of demand in Japan, particularly in terms of renewal demand.
- The need for energy-conserving boilers is increasing overseas, particularly in developing nations.

Emphasis of Future Activities

- Maintain and expand our domestic business.
- Expand our overseas business.

Super Eqos EQi Series

Super Vacotin Heater
GTL Series

12th Medium-Term Management Plan and CSR Topics

This section introduces how Takuma's management and the management of major Group companies view CSR issues and how they are working to resolve them as they strive to pursue their respective missions under the 12th Medium-Term Management Plan, which began in FY2018.

Corporate Services Division

Koji Tanaka **Executive Manager, Corporate Services Division**

The Corporate Services Division's mission is to help boost profits throughout the Group by providing services to its various departments, for example so they can more effectively utilize information and other management resources and practice legal risk management. To that end, it is called upon to provide higher-quality services to help achieve steady growth and to enhance the Group's capabilities.

Due to the extensive scope of these operations, the Division's activities encompass a variety of CSR issues, including with regard to strengthening relationships with shareholders, BCP, information security, and reducing risk. Particularly important priorities under the current Medium-Term Management Plan address human resources, an area that plays an essential role as the basis of all business activities, including hiring practices and training programs as well as the development of an environment that will allow each and every employee to do his or her job in an energetic and engaged manner and to take advantage of his or her skills and abilities, while simultaneously facilitating improvements in productivity.

Corporate Planning & Administration Division

Tsuyohito Nishiyama **Executive Manager, Corporate Planning & Administration Division**

The current Medium-Term Management Plan sets forth five policies to address the theme of strengthening corporate capability to facilitate steady growth.

Strengthening the Group's corporate capabilities encompasses the meaning of transforming Takuma so that it will be universally recognized as a good company, and the only way to do that is not only to pursue performance metrics, for example by increasing sales and profits, but also to participate actively in the process of addressing social needs.

We are seeing a shift in how the world determines corporate value in the form of a move from tangible assets to intangible assets, and one key area of risk that the world recognizes now is the environment.

The Group is keenly attuned to these social trends, and as we pursue a range of initiatives to make Takuma a better company, we will be fulfilling our responsibilities by working to resolve social issues in the areas of renewable energy utilization and environmental protection.

12th Medium-Term Management Plan and CSR Topics

+ Corporate Marketing Group

Business Administration Division

Kengo Numata Executive Manager, Corporate Marketing Group & Business Administration Division & Environmental Plant Division

We are seeking to increase Takuma's corporate value and to achieve sustained growth by formulating and executing a business strategy that will earn us the trust of a broad range of customers and other stakeholders.

For example, our ability to consistently supply high-quality solutions throughout the plant life cycle while responding precisely to changes in the market environment and evolving customer needs yields mutual profits for both customers and the Group over the long term.

At the same time, maintaining and expanding our market position in such EPC markets as waste treatment plants and biomass power plants will allow us to make a significant contribution to the resolution of a variety of current social issues.

By formulating and executing these business strategies, I believe we will be able to build a business platform that is resistant to change so that we can continue to develop as a company that plays an essential role in society.

Environmental Plant Division

Hidetoshi Tomita Deputy Executive Manager, Environmental Plant Division

The Paris Agreement, which seeks to eliminate the world's dependence on fossil fuels, entered into force in 2016, and Takuma, too, has an obligation to pursue corporate activities to help achieve its goals. The Environmental Plant Division will help bring about a recycling-based society through the current Medium-Term Management Plan. We will reduce environmental impacts by working to eliminate and reduce greenhouse gases, specifically through advanced thermal recovery with high-efficiency power generation in waste treatment plant construction, through the reduction of CO_2 emissions in core facility improvement projects at existing plants, and through power generation using incineration heat at sewage sludge incineration plants. In addition, we will coexist alongside local residents through our DBO business by utilizing waste treatment facilities as places of environmental awareness-raising and as disaster prevention facilities in times of large-scale disasters, and by performing daily maintenance in an appropriate manner. Finally, we in the Environmental Plant Division look forward to fulfilling our social responsibility to help realize a recycling-based society by providing high-quality products and services.

Energy Plant Division

Mitsuaki Adachi Executive Manager, Energy Plant Division

Takuma's energy business has utilized the FIT scheme to deliver numerous biomass power plants, and we continue to do so today. Under the current Medium-Term Management Plan, we will prioritize a permanent approach to plant operation, including by continuing to accept orders and by enhancing maintenance business structures for operational plants, so that these facilities can serve as the foundation for clean energy.

We see our role with regard to a sustainable society as contributing to society by resolving issues through our businesses, for example by contributing to environmental protection by reducing CO_2 emissions through the use of renewable energy in response to specific measures by governmental agencies to achieve the Sustainable Development Goals (SDGs), including by promoting use of renewable energy, addressing climate change, and building a recycling-based society.

International Operations Division

Takashi Manabe Executive Manager, International Operations Division

The International Operations Division has identified a number of priorities as it works to implement the current Medium-Term Management Plan.

First, reflecting our belief that addressing compliance, safety, and environmental issues is a given, we are working to develop our overseas businesses in a way that accords with local practices while understanding and respecting the commercial customs, religion, culture, and values in the countries where we do business.

Next, we will help address environmental and energy issues and realize a recycling-based society by working to create renewable energy and to improve the local waste treatment environment through the supply of biomass boilers such as bagasse-fired boilers and waste incineration plants that incorporate exceptional technologies.

Finally, we will strengthen our solutions-based sales initiatives, which are conceived to offer high added value based on customer needs.

We will fulfill our social responsibility by contributing to the sustained development of other countries through these initiatives.

+ Engineering Group

Management Center

Hiroaki Nanjo Executive Manager, Engineering Group & Management Center

The Management Center is responsible for cost management and overall process management. Even as we continue to see robust demand for products such as biomass boilers and municipal solid waste treatment plants, the business environment is changing along with the structure of society. We will work to achieve a competitive cost structure by optimizing costs to facilitate sustained growth. To that end, we will monitor pricing trends as they relate to supplies, equipment, construction, and other costs and apply that information precisely to the processes we use to establish quotation costs and manage working budgets. We will also work to limit risk by focusing on process management and cost progress management, including for civil engineering construction work.

In our overseas businesses, we will work to differentiate our offerings from those of our competitors by increasing the competitiveness of our boiler plants. With regard to waste treatment plants, we will study structures for facilitating cooperation with partner companies and work to develop schemes for entering new markets.

Technology Center

Akira Taguchi Executive Manager, Technology Center

The Technology Center is responsible for a swath of operations ranging from the development of Takuma's core technology products to design while surveying and monitoring the latest social needs.

In recent years, we have seen a trend toward proper processing of waste and hazardous materials in the environmental sector, along with a growing focus on reducing waste generation, reusing waste, and reducing waste volume. In the energy sector, the trend is toward making use of fuels and energy sources that have gone unutilized in the past, and on creating new types of energy. Against this backdrop, Takuma will continue to consistently ship environmentally friendly products while making use of, and further developing, its stable of core technologies in areas such as combustion, incineration, boilers, and exhaust gas treatment.

Project Center

Hideki Takeguchi Executive Manager, Project Center

The equipment and plants that Takuma provides effectively utilize waste products and byproducts from human life and production activities, including municipal waste, industrial waste, sewage sludge, and biomass, to create the utilities—electricity and heat—that people need to live and that economies need to grow. In this way, we are able to give something back to society.

Today, as we find ourselves faced with the need to further increase use of renewable energy as one way to protect the Earth's environment, the Project Center is working to help build a society where future generations can enjoy rich and fulfilling lifestyles, including by supplying plants designed to further the realization of a recycling-based society and to reduce CO_2 emissions, for example by generating power from municipal solid waste, sewage sludge, and biomass, and by creating and developing the technologies and processes that will help expand the markets for such plants.

Engineering Center

Norito Uchiyama Executive Manager, Engineering Center

The Engineering Center will promote the streamlining of specifications and design work in a way that takes life cycle cost into account and provides technologies with value in terms of equipment and control by analyzing plant data and utilizing information and communications technology (ICT). We will also realize stable operation and management over the long term by promoting energy savings at all types of facilities and providing solutions that deliver exceptional economic performance at a high level of efficiency.

We will also pursue open innovation in an effort to fulfill our social responsibility as a corporation by adopting a global perspective and working in partnership with Group companies, affiliates, and other organizations to accommodate changes in the business environment.

To help realize a low-carbon society, we will strive to bring innovation to processes and products and to develop products that satisfy all stakeholders.

Construction Center

Ryoji Tani Executive Manager, Construction Center

The current Medium-Term Management Plan calls on us to reliably fulfill a large order backlog and to accommodate a robust flow of new projects, signaling an environment in which we are fortunate to be able to do business. At the same time, that environment raises concerns about waning job enthusiasm due to a heavy workload, the unfortunate occurrence of occupational accidents, and a tendency for human resources training measures to take a back seat to other priorities since most projects involve long lead times. Based on these facts, I see our most significant issue as the need to ensure employee health and safety, to facilitate enthusiasm, and to build solid operational structures that will position us to take the next step once the current plan is complete. As we work to overcome these challenges, veterans and newcomers alike will do well to remember and draw encouragement from one of the motivations that drove them to join Takuma in the first place: love for a job involving protecting the environment and utilizing energy effectively.

12th Medium-Term Management Plan and CSR Topics

+ Group Companies

NIPPON THERMOENER CO., LTD.

Masahiko Izumi, President and Representative Director

Reflecting our philosophy of "Service to the nation through boiler manufacturing," we strive to contribute to society through corporate activities in the package boiler segment of the market, and we consider our corporate activities themselves to be CSR activities.

The current Medium-Term Management Plan sets forth two basic goals in order to increase corporate value: increasing the size of the company and developing a more advanced level of quality. To achieve these goals, we will develop and supply safe, high-quality products and services; increase customer and business partner satisfaction; and improve employee satisfaction in the process while boosting organizational trust. If our products and services enter into even more widespread use in society, our contribution in the environmental and energy sectors will grow, helping to increase our corporate value.

Going forward, we will fulfill our CSR by striving to serve as a high-value company for all stakeholders through corporate activities such as these.

Takuma Technos Co., Ltd.

Kazunori Tsuji, President

With 68 offices, worksites, and other facilities around Japan, we operate and manage facilities under contract. In recent years, the number of DBO and O&M facilities that we serve in partnership with Takuma Co., Ltd., is increasing, and the manner in which we operate those facilities is changing from the past.

However, our mission of providing safety and stability to customers at each facility we manage and of supervising the operations with which we are entrusted in a way that inspires customers' peace of mind has not changed. To fulfill that mission, all of our employees must come together to harness the full potential of each facility without accident or disaster so that waste products can be treated properly and ever-more-demanding requirements satisfied. We will do everything we can going forward under the current Medium-Term Management Plan to fulfill our company's social responsibility.

SUNPLANT Co., Ltd.

Syusuke Suzuki, President

Our philosophy revolves around helping protect the regional environment by utilizing air-conditioning and sanitary equipment design and installation technologies.

It is widely recognized that overwork is an issue in the construction industry, of which we are a part. We recognize this issue as a life-or-death challenge for our company, and we are working to create an environment in which employees can balance their jobs with their private lives, for example by actively participating in the Work-Life Balance campaign led by the Tokyo Metropolitan Government. We also continue to run the company in a fair and just manner, with an absolute focus on compliance. Going forward, we will strive to increase CSR awareness, for example by offering internal classes designed to foster employees' understanding of Japan's legal system.

Dan-Takuma Technologies Inc.

Yoshiki Kita, PRESIDENT

For half a century, we have created highly clean environments for production processes in the semiconductor and electronic precision fabrication industries, and we have made broad contributions to society by making possible improvements in rational production that have helped maintain rich and safe lifestyles while solving environmental and energy issues by supplying clean equipment and systems. At the same time, we believe that efforts to maintain and promote compliance provide a crucial basis for the operation of our businesses, and going forward, we will strive on an ongoing basis to enhance compliance by assessing our operations from an ESG standpoint.

In addition, we will work to help achieve the SDGs through cooperation, contribution, and partnership involving customers and other stakeholders, both in Japan and overseas.

This page introduces the views of members of our Audit & Supervisory Committee on the policies, priority measures, and other provisions of the current Medium-Term Management Plan, including with regard to initiatives to increase the Group's corporate value and their expectations and wishes for the future.

+ Audit & Supervisory Committee Members

Yasushi Enomoto Audit & Supervisory Committee Member (Director)

Having identified maintaining its role of being indispensable presence in society as a leading company in the field of renewable energy utilization and environmental protection as its corporate vision, Takuma has contributed to environmental protection by realizing a diverse range of customer needs and by improving technology through research and development. We also work to protect the environment via a range of activities that includes limiting energy consumption and waste emissions and community service programs.

In addition, we are achieving steady results through ongoing initiatives to promote compliance management.

Going forward, we believe that cultivating increased awareness of global needs as our overseas businesses develop, for example in the form of ESG investment and the UN's Sustainable Development Goals (SDGs), and bringing those priorities to bear in our businesses will help us contribute to society while increasing our corporate value.

Hiromichi Satake Audit & Supervisory Committee Member (Outside Director)

The Takuma Group built structures to deliver results on a stable basis through the previous 11th Medium-Term Management Plan. Under the 12th Medium-Term Management Plan, I expect to see the company strengthen risk management and develop into an organization that is even more resistant to changes in the business environment.

We are seeing results from our efforts to contribute to society, and it is desirable that we work to ensure those efforts penetrate every aspect of the Group's operations so that they do not lose their viability. Encouraging all employees to continuously think about what they should do and how they should act will allow us to increase our corporate value. As an outside director, I will work from an independent, fair perspective to strengthen the Group's management and supervisory functions and to establish CSR management with the goal of precisely understanding stakeholder expectations and increasing stakeholder satisfaction.

Osamu Iwahashi Audit & Supervisory Committee Member (Outside Director)

I have served as an auditor and director (as a member of the Audit & Supervisory Committee) at Takuma for six years, during which time I have drawn on experience I gained during my involvement with law enforcement policy for many years. I have pursued auditing and other operations primarily from a corporate governance and compliance perspective, and I believe that an emphasis on CSR is an essential part of corporate management.

Takuma's Energy from Waste plants and biomass-fueled power plants make up its core businesses, and the company is fortunate in that these businesses themselves help it fulfill its corporate social responsibility. In addition, the company has actively pursued a broad array of CSR activities, including through solar power installations, research into how waste gas and heat can be used in crop cultivation, and participation in, and contribution to, regional activities.

Going forward, I'm confident that Takuma will be able to effectively pursue activities that achieve the aims of CSR in its primary businesses and associated operations.

Minoru Murata Audit & Supervisory Committee Member (Outside Director)

We contribute to society by creating value through maintenance of social infrastructure that underpins human lifestyles and of industrial equipment. The products and services that are the ultimate result of our corporate activities live up to the standards set by society's expectations, and we have built a track record of success through our efforts to increase social satisfaction.

At the same time, an increasingly diverse society demands a more sophisticated type of value, and attention now encompasses not only deliverables, but also the processes that create them (i.e., production processes). To take CSR to the next level, it will be necessary to increase the satisfaction of the people that participate in the processes that give rise to deliverables. It will be important to reduce environmental impacts in manufacturing and construction processes, and to improve worker safety and the work environment. Going forward, I believe that taking into consideration stakeholders such as employees and local residents will help us pursue an even higher level of CSR.

Company Outline

Name: TAKUMA CO., LTD.
Head office location: 2-2-33 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan
TEL +81-6-6483-2609 FAX +81-6-6483-2751 (operator)
Representative Director: Takaaki Kato, President and CEO
Established: June 10, 1938
Capital: JPY 13,367,457,968 (as of March 31, 2018)
Main business areas: The design, construction and superintendence of a wide variety of boilers, plant machinery, pollution prevention plants, environmental equipment plants, and heating and cooling equipment and feed-water / drainage sanitation equipment and facilities
The design, construction and superintendence of civil, architecture and other works
Number of employees (non-consolidated): 837 (as of March 31, 2018)
Number of employees (consolidated): 3,609 (as of March 31, 2018)

+ Permits and registrations

- **Head Office, branch offices and other business offices**

  Construction license (Minister of Land, Infrastructure, Transport and Tourism license, Special 27-6129, Special 29-6129)
  Construction consultant registration (Minister of Land, Infrastructure, Transport and Tourism registration, Construction 26-10202)
  First-class architect office registration (01A02903)
  ISO 9001 quality management system certification

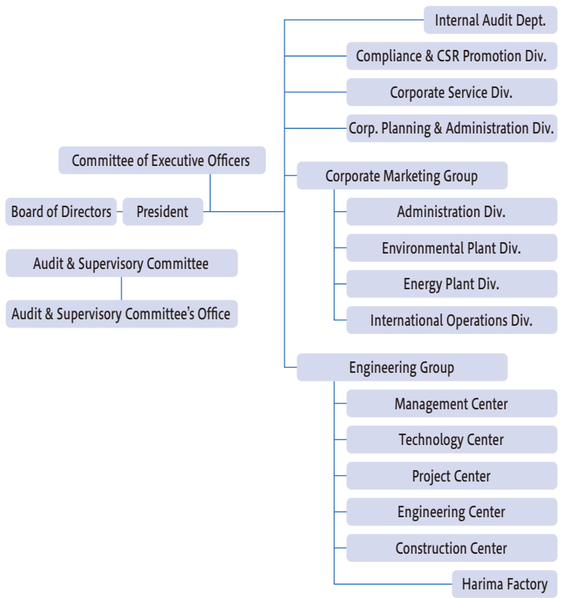
- **Harima Factory**

  ISO 9001 quality management system certification
  ISO 14001 environmental management systems certification
  Permission to manufacture boilers and pressure vessels, permission to manufacture cranes (Ministry of Health, Labour and Welfare)
  Manufacture of specific high-pressure gas facilities (Ministry of Economy, Trade and Industry)
  Manufacture of refrigerators (Governor of Hyogo Prefecture)

JQA-1952 ISO 9001 certification: Head Office, Osaka Office, Tokyo Branch, Chubu Branch, Kyushu Branch, Hokkaido Branch and Harima Factory

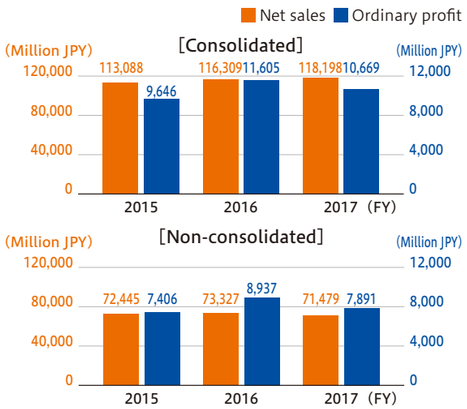
JQA-EM0313 ISO 14001 certification: Harima Factory

+ Corporate structure (as of June 27, 2018)

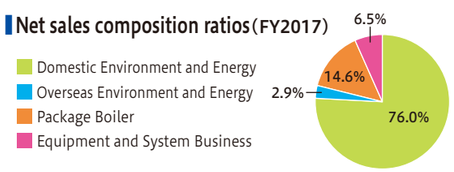


+ Balance sheet overview and net sales composition ratios

Balance sheet overview



Net sales composition ratios (FY2017)



Business Summary

+ Environmental and energy business

Municipal solid waste treatment plants

We support the realization of a recycling-oriented society using advanced waste treatment technologies that meet the needs of local communities.

- Energy from Waste plant
- Pyrolysis gasification and melting plant
- Resource recycling and collection plant
- Bulky garbage crushing plant
- Incineration ash and fly ash melting plant
- Waste to solid fuel conversion plant
- Transition and intermediate processing plant
- Raw fuel (biogas) recovery plant
- Various types of pollution prevention equipment


Energy from Waste plant


Bulky garbage crushing plant

Industrial waste treatment plants

Using advanced incineration technologies, we can even treat toxic substances suitably and we are supporting the environmental protection efforts of industry.

- Industrial waste treatment plant


Industrial waste treatment plant


Plant that generates power from industrial waste and provides heat to a plantation

Energy plants

Takuma's core technologies are utilized in various types of boilers, starting with biomass boilers, as well as total systems.

- Biomass boiler
- Fossil fuel boiler
- Waste heat boiler
- Power plant


Biomass power generation boiler


Waste heat boiler

Water treatment plants

We are working to purify wastewater with a holistic perspective through a "dialogue with water."

- Sewage and wastewater treatment plant
- Various types of advanced sewage treatment plant
- Sludge treatment plant
- Sewage sludge-fueled power plant
- Plant to process water that infiltrates final disposal sites


Upflow moving-bed filtration system


Sewage sludge-fueled power plant

+ Package boiler

General-purpose boilers

As the convergence of Takuma's combustion technologies, our boilers are a reliable brand that has earned the support of a wide range of industries.

- Once-through boiler (Eqos, Super Eqos)
- Vacuum-type water heater (Vacotin heater)
- Package water-tube boiler
- Smoke tube boiler (RE boiler)
- Heat-transfer oil boiler (thermoheater)
- Radiation heating equipment (strip heater)
- Various equipment for ships


Vacotin heater


Thermoheater


Super Eqos


RE boiler

Note: These products are handled by Nippon Thermoener Co., Ltd., which is one of our group companies.

+ Equipment and systems business

Air-conditioning equipment and clean systems

We provide comfortable, clean environments to customers in the semiconductor industry as well as many locations such as universities, research institutions, and hospitals.

- Building equipment
- Air-conditioning equipment
- Cleaning and drying devices
- Clean room
- Clean devices
- Chemical filters


Chemical filters


Clean oven


Clean booths

History

Founder Tsunekichi Takuma established our philosophy of “Service to the nation through boiler manufacturing.” The goal of becoming a technologically driven company based on that belief has been the basis of Takuma’s operations throughout its 80 years of history.

1912 to 1950

Tsunekichi began shipping Takuma boilers in 1912, and in 1938 he founded Takuma Boiler Manufacturing Co., Ltd., with the philosophy of “Service to the nation through boiler manufacturing.” The corporate stance and philosophy that form the foundation of Takuma developed during this period.

1951 to 1971

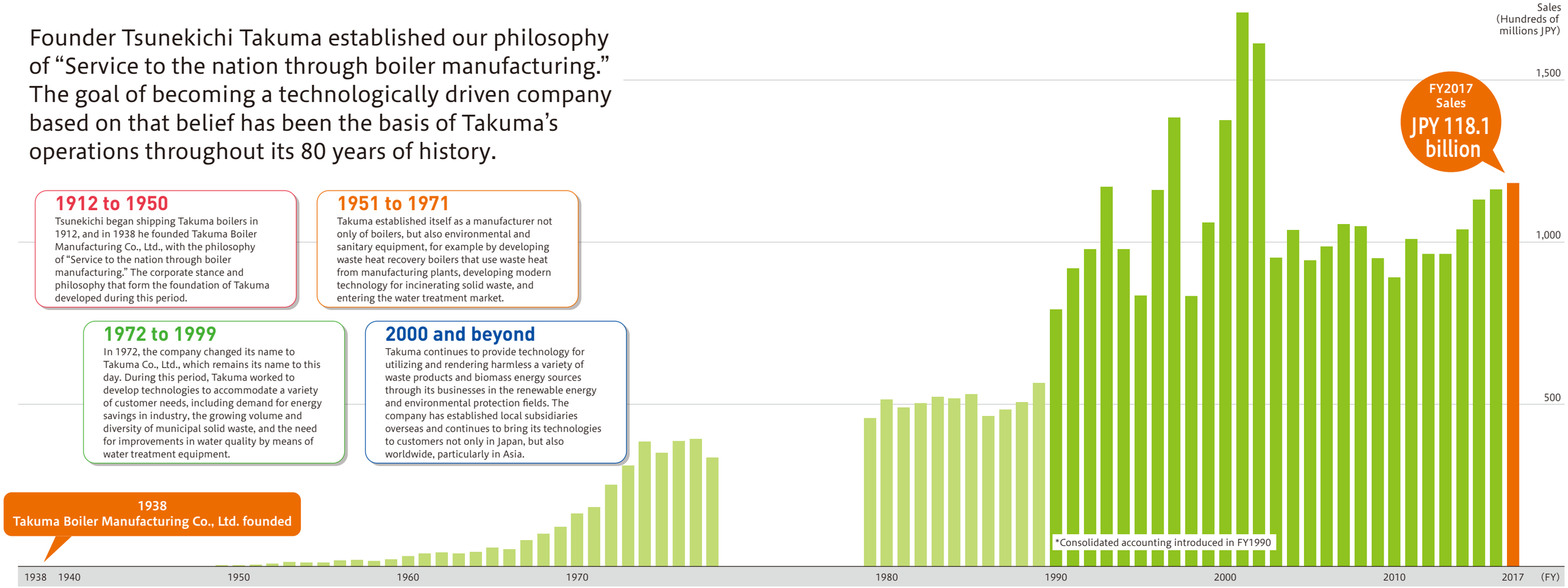
Takuma established itself as a manufacturer not only of boilers, but also environmental and sanitary equipment, for example by developing waste heat recovery boilers that use waste heat from manufacturing plants, developing modern technology for incinerating solid waste, and entering the water treatment market.

1972 to 1999

In 1972, the company changed its name to Takuma Co., Ltd., which remains its name to this day. During this period, Takuma worked to develop technologies to accommodate a variety of customer needs, including demand for energy savings in industry, the growing volume and diversity of municipal solid waste, and the need for improvements in water quality by means of water treatment equipment.

2000 and beyond

Takuma continues to provide technology for utilizing and rendering harmless a variety of waste products and biomass energy sources through its businesses in the renewable energy and environmental protection fields. The company has established local subsidiaries overseas and continues to bring its technologies to customers not only in Japan, but also worldwide, particularly in Asia.



1938 Takuma Boiler Manufacturing Co., Ltd. founded

1912 The first “Takuma boiler” introduced by our founder, Tsunekichi Takuma


Tsunekichi Takuma

1930 Tsunekichi Takuma commended as one of the ten great inventors of Japan during the Meiji and Taisho periods (1868–1926)

1938 Takuma Boiler Manufacturing Co., Ltd. founded
Company Motto instituted:
“Service to the nation through boiler manufacturing”


Amagasaki Factory

1942 Operation began at Harima Factory


Harima Factory under construction

1949 Bagasse-fired boiler, the first product of its kind in the industry, exported

1949 Company listed on the Osaka and Tokyo stock exchanges

1953 Head Office moved to Osaka’s Kita-ku District


Former head office (Dojimahama)

1958 Business expanded into the environmental facility sectors, including waste incineration and water treatment plants

1963 Japan’s first waste incineration plant delivered
Sewerage treatment facility delivered


Japan’s first waste incineration plant

1970 Waste Management and Public Cleansing Act and Water Pollution Control Act enacted

1972 Company renamed Takuma Co., Ltd.

1975 Bulk production began on “vacotin heater,” the world’s first vacuum-type hot water heater


Vacotin heater

1986 The first overseas delivery of a waste treatment facility completed

1992 New Company Motto instituted:
“Value Technology, Value People, Value the Earth”

1993 Basic Environment Act enacted

1995 Amagasaki Head Office Building completed


Amagasaki Head Office Building

1997 ISO9001 certification obtained

1998 Japan’s largest Energy from Waste plant delivered
(Tokyo Shinkoto Waste Treatment Plant Capacity: 1,800 tons per day)

1999 ISO14001 certification obtained for our Harima Factory

1999 Act on Special Measures against Dioxins enacted

2004 Takuma’s first “Environmental Report” issued
The “Takuma Group Code of Conduct” instituted

2005 Takuma Hanyokikai Co., Ltd., a subsidiary involved in the manufacture and sale of small boilers, and Ebara Boiler Co., Ltd. merged and renamed Nippon Thermoener Co., Ltd.

2005 The “Takuma Environmental Policy” instituted
The “Personal Information Protection Policy” instituted

2006 The “Compliance Declaration” instituted
The “Takuma Group Ethics Charter” instituted
Takuma participated in the UN Global Compact

2007 Takuma’s first “CSR Report” issued

2010 Energy from Waste plant delivered in Europe (U.K.)


Lakeside EfW Plant

2012 Feed-in tariff (FIT) program launched to facilitate fixed-cost purchases of renewable energy

2013 Operation of the Takuma Solar Power Plant began


Takuma Solar Power Plant

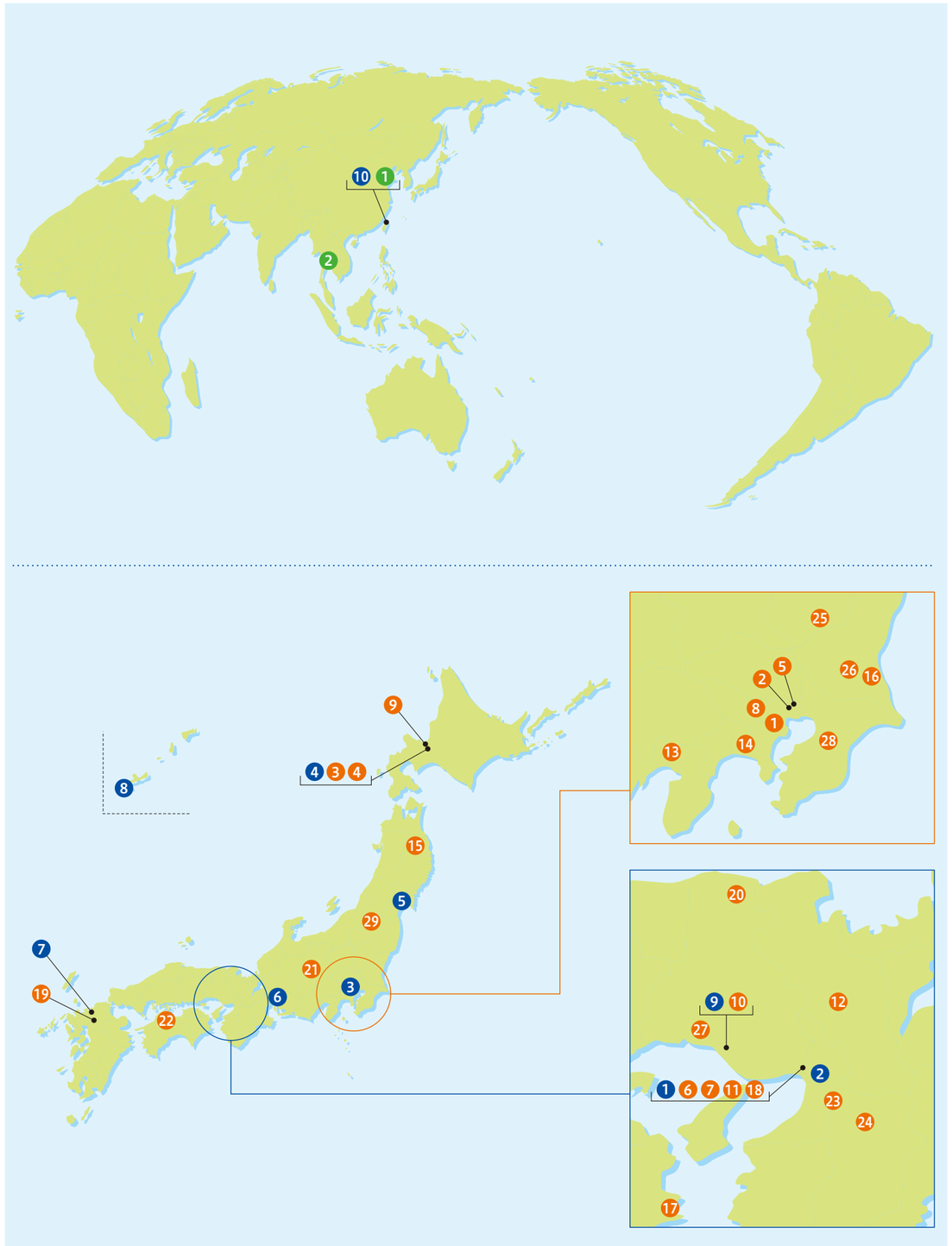
2017 Order received for a 50,000 kW biomass power plant (FIT-approved facility)


Biomass Power Plant

The Takuma Group Network

(as of June 27, 2018)

Takuma's business offices　Overseas group companies　Group companies in Japan



Takuma's business offices

1 **Head Office**
2-2-33 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan
TEL +81-6-6483-2609 FAX +81-6-6483-2751

2 **Osaka Office**
Hanahara 6th Bldg., 6-8-31 Nishinakajima, Yodogawa-ku, Osaka 532-0011, Japan
TEL +81-6-4805-7600 FAX +81-6-4805-7601

3 **Tokyo Branch**
Nomura Higashi-nihonbashi Bldg., 1-1-7 Higashinihonbashi, Chuo-ku, Tokyo 103-0004, Japan
TEL +81-3-5822-7800 FAX +81-3-5822-7888

4 **Hokkaido Branch**
Daigo Bldg., 5-11, Ohdori Nishi, Chuo-ku, Sapporo, Hokkaido 060-0042, Japan
TEL +81-11-221-4106 FAX +81-11-241-0523

5 **Tohoku Branch**
NMF Sendai Aoba-dori Bldg., 2-1-2 Ichibancho, Aoba-ku, Sendai, Miyagi 980-0811, Japan
TEL +81-22-222-3042 FAX +81-22-225-6759

6 **Chubu Branch**
Daitokai Bldg., 3-22-8, Meieki, Nakamura-ku, Nagoya, Aichi 450-0002, Japan
TEL +81-52-571-5211 FAX +81-52-581-3005

7 **Kyushu Branch**
Yakuin Business Garden, 1-1-1 Yakuin, Chuo-ku, Fukuoka 810-0022, Japan
TEL +81-92-717-2828 FAX +81-92-717-2830

8 **Okinawa Branch**
Commons Bldg., 1-11-12 Mashiki, Ginowan, Okinawa 901-2224, Japan
TEL +81-98-898-6650 FAX +81-98-898-6657

9 **Harima Factory**
1-2-1 Shinhama, Arai-cho, Takasago, Hyogo 676-8540, Japan
TEL +81-79-443-6511 FAX +81-79-443-6599

10 **Taipei Branch**
7F., No.16, Lane 35, Jihu Rd., Neihu District, Taipei 114-92, Taiwan
TEL +886-2-8752-3838 FAX +886-2-2656-0584

Overseas group companies

1 **Taiden Environtech Co., Ltd.**
Maintenance of waste treatment and other facilities
7F., No. 16, Lane 35, Jihu Rd., Neihu District, Taipei 114-92, Taiwan
TEL +886-2-2659-7137 FAX +886-2-2656-0584

2 **Siam Takuma Co., Ltd.**
Sale of energy and environment-related plants, sales of parts for the same plants and after-sales service
77/53 Sinn Sathorn Tower, 15th Floor, Krungdhonburi Road, Klongtonsai, Klongsarn, Bangkok 10600, Thailand
TEL +66-2438-5616 FAX +66-2440-0114

Group companies in Japan

1 **Nippon Thermoener Co., Ltd.**
Manufacture and sale of a wide range of boilers and related equipment
Shirokanedai Bldg., 3-2-10 Shirokanedai, Minato-ku, Tokyo 108-0071, Japan
TEL +81-3-6408-8251 FAX +81-3-6408-8278
http://www.n-thermo.co.jp

2 **Takuma Technos Co., Ltd.**
Maintenance, management and operation of waste treatment facilities, water treatment facilities and other facilities, as well as the design, installation and management of various types of boilers, environmental equipment and other equipment
10th Chuo Bldg., 1-5-6 Nihonbashi-honcho, Chuo-ku, Tokyo 103-0023, Japan
TEL +81-3-3231-2911 FAX +81-3-3231-2917
http://www.takumatechnos.co.jp

3 **Hokkaido Sanitary Maintenance Co., Ltd.**
Operation and maintenance of sewage treatment facilities
Daigo Bldg., 5-11, Ohdori Nishi, Chuo-ku, Sapporo, Hokkaido 060-0042, Japan
TEL +81-11-221-8398 FAX +81-11-221-8542

4 **Takuma Technos Hokkaido Co., Ltd.**
Operation and maintenance of waste treatment facilities
Daigo Bldg., 5-11, Ohdori Nishi, Chuo-ku, Sapporo, Hokkaido 060-0042, Japan
TEL +81-11-221-4128 FAX +81-11-221-1030

5 **Sun Plant Co., Ltd.**
Design, construction and superintendence of air-conditioning equipment, feed-water/drainage sanitation equipment, and electrical equipment
Nomura Higashi-nihonbashi Bldg., 1-1-7 Higashinihonbashi, Chuo-ku, Tokyo 103-0004, Japan
TEL +81-3-5825-0921 FAX +81-3-5825-1631
http://www.sunplant.co.jp

6 **Takuma Engineering Co., Ltd.**
Design of environmental equipment plants and energy plants
Takuma Bldg., 2-2-33 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan
TEL +81-6-6487-4820 FAX +81-6-6487-4829
http://www.takuma-eng.co.jp

7 **Takuma System Control Co., Ltd.**
Design of electrical instrumentation equipment, including environmental equipment plants and energy plants
Takuma Bldg., 2-2-33 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan
TEL +81-6-6487-4830 FAX +81-6-6487-4839
http://www.takuma-sc.co.jp

8 **Dan-Takuma Technologies Inc.**
Manufacture and sale of clean equipment, cleaning equipment, chemical filters, clean rooms, drying equipment and thermal chambers
3-12-16 Iwadokita, Komae, Tokyo 201-0004, Japan
TEL +81-3-3488-1111 FAX +81-3-3488-1118
http://www.dan-net.com

9 **Kyoritsu Setsubi Co., Ltd.**
Design, construction and superintendence of waste treatment facilities, mechanical equipment of sewage treatment facilities, and boiler plants for general industries
5-1-38 Yurigahara, Kita-ku, Sapporo, Hokkaido 002-8081, Japan
TEL +81-11-770-2811 FAX +81-11-770-2822

10 **Kankyo Sol-Tech Co., Ltd.**
Analyzing and measurement for environment-related issues, including water quality, exhaust gas and soil pollution
1-2-1 Shinhama, Arai-cho, Takasago, Hyogo 676-0008, Japan
TEL +81-79-443-6508 FAX +81-79-443-6510
http://www.k-soltech.co.jp

11 **Takuma Plant Service Co., Ltd.**
Maintenance of a wide variety of boilers and environmental facilities
2-2-27 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan
TEL +81-6-6488-8434 FAX +81-6-6488-0300
http://www.takuma-ps.com

12 **Campo Recycle Plaza Co., Ltd.**
Municipal solid waste and industrial waste treatment services
1 Takayanishitani, Sonobe-cho, Nantan, Kyoto 622-0032, Japan
TEL +81-771-68-3636 FAX +81-771-68-3639
http://www.c-rp.co.jp

13 **Nagaizumi High Trust Co., Ltd.**
Facility upgrading, operation and maintenance of municipal solid waste final disposal sites
374-12 Higashino, Nagaizumi-cho, Suntou-gun, Shizuoka 411-0931, Japan
TEL +81-55-989-2268 FAX +81-55-987-9935
http://www.nagaizumi-ht.jp

14 **Fujisawa High Trust Co., Ltd.**
Operation and maintenance management of municipal solid waste treatment facilities
2168 Ishikawa, Fujisawa, Kanagawa 252-0815, Japan
TEL +81-466-45-5411 FAX +81-466-45-5454

15 **Iwate-Kenpoku Clean Co., Ltd.**
Municipal solid and industrial waste treatment services
48-34, Dai 20 Chiwari, Esashika, Kunohe-mura, Kunohe-gun, Iwate 028-6505, Japan
TEL +81-195-42-4085 FAX +81-195-42-4550
http://www.iwate2cln.co.jp

16 **Hitachinaka-Tokai High Trust Co., Ltd.**
Operation and maintenance management of municipal solid waste treatment facilities
103-2 Shinkocho, Hitachinaka, Ibaraki 312-0005, Japan
TEL +81-29-265-5371 FAX +81-29-265-5372
http://hitachinaka-tokai-ht.com

17 **Anan High Trust Co., Ltd.**
Operation and maintenance management of municipal solid waste treatment facilities
1-5 Kokatsu, Tachibana-cho, Anan, Tokushima 779-1631, Japan
TEL +81-884-49-5823 FAX +81-884-49-5824
http://www.ecopark-anan.com

18 **Takuma Energy Co., Ltd.**
Power retail business
Takuma Bldg., 2-2-33 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan
TEL +81-6-6487-4870 FAX +81-6-6483-2794

19 **Kurume High Trust Co., Ltd.**
Operation and maintenance management of a municipal solid waste treatment facilities
2225 Hacchojima, Miyanojin-machi, Kurume, Fukuoka 839-0805, Japan
TEL +81-942-27-7490 FAX +81-942-27-7491
http://www.kurume-ht.com

20 **Hokutan High Trust Co., Ltd.**
Operation and maintenance management of a municipal solid waste treatment facilities
943 Booka, Takeno-machi, Toyooka, Hyogo 669-6331, Japan
TEL +81-796-21-9111 FAX +81-796-21-9112
http://hokutan-ht.com

21 **Suwako High Trust Co., Ltd.**
Operation and maintenance management of a municipal solid waste treatment facilities
4769-14 Uchiyama, Okaya, Nagano 394-0055, Japan
TEL +81-266-78-1590 FAX +81-266-78-1591
http://www.suwako-ht.jp

22 **Imabari High Trust Co., Ltd.**
Operation and maintenance management of a municipal solid waste treatment facilities
394 Machiyakou, Imabari, Ehime 799-1514, Japan
TEL +81-898-35-5181 FAX +81-898-35-5182
http://bariclean.jp

23 **Energy Mate Co., Ltd.**
Sale of cogeneration systems and systems for the generation equipment of the same and total service for onsite energy systems for consumer use
Midosuji Daiwa Bldg., 3-6-8 Kyutaromachi, Chuo-ku, Osaka 541-0056, Japan
TEL +81-6-6241-6200 FAX +81-6-6241-6210
http://www.energy-mate.co.jp

24 **Kashihara High Trust Co., Ltd.**
Operation and maintenance management of municipal solid waste treatment facilities
1038-2 Kawanishi-cho, Kashihara, Nara 634-0826, Japan
TEL +81-744-26-6227 FAX +81-744-26-6228

25 **Tochigi High Trust Co., Ltd.**
Industrial waste treatment services
18-3 Kinugaoka, Moka, Tochigi 321-4367, Japan
TEL +81-285-83-3966 FAX +81-285-83-6500
http://www.t-hitrust.co.jp

26 **Katsuta Co., Ltd.**
Industrial waste and municipal solid waste treatment services
1968-2 Koya, Hitachinaka, Ibaraki 312-0002, Japan
TEL +81-29-270-3711 FAX +81-29-270-3712
http://www.eco-katsuta.com

27 **R.B.N. Co., Ltd.**
Municipal solid waste, including waste home appliances and office automation equipment, and industrial waste treatment services
3059-20 Nakajima, Shikama-ku, Himeji, Hyogo 672-8035, Japan
TEL +81-79-243-1200 FAX +81-79-243-1202
http://rbn.jp

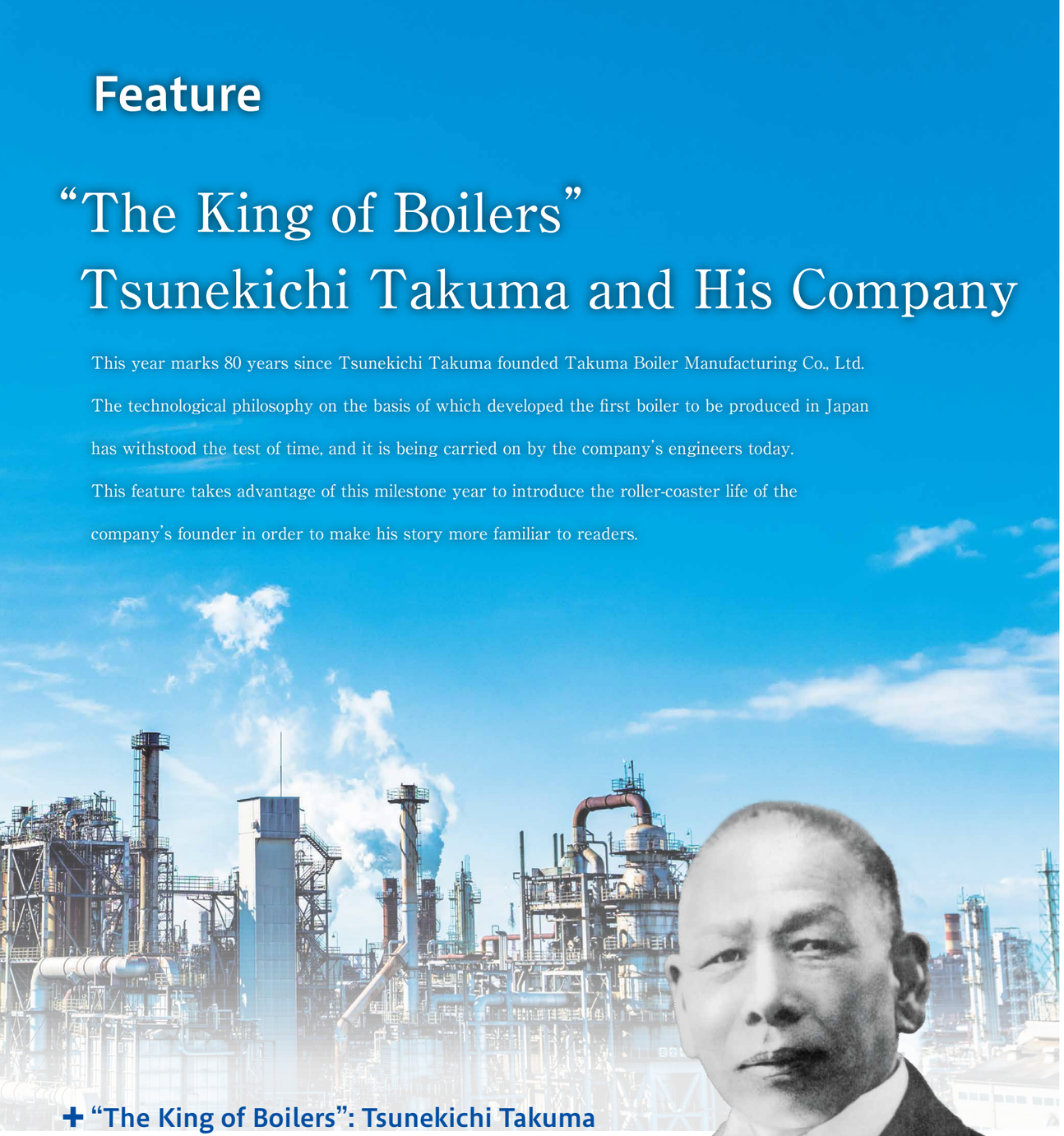
28 **Ichihara New Energy Co., Ltd.**
Industrial and municipal solid waste treatment services
733 Mandano, Ichihara, Chiba 290-0549, Japan
TEL +81-436-50-8300 FAX +81-436-50-8400
http://www.ichihara-new.com

29 **Ecos Yonezawa Co., Ltd.**
Final disposal of industrial waste
7028-1 Yanazawa, Yonezawa, Yamagata 992-0077, Japan
TEL +81-238-39-4050 FAX +81-238-39-4051
http://www.ecos-y.co.jp

Feature

“The King of Boilers” Tsunekichi Takuma and His Company

This year marks 80 years since Tsunekichi Takuma founded Takuma Boiler Manufacturing Co., Ltd. The technological philosophy on the basis of which developed the first boiler to be produced in Japan has withstood the test of time, and it is being carried on by the company’s engineers today. This feature takes advantage of this milestone year to introduce the roller-coaster life of the company’s founder in order to make his story more familiar to readers.



+ “The King of Boilers”: Tsunekichi Takuma

Tsunekichi Takuma, the founder of Takuma, was also an inventor who invented the Takuma boiler, the first water tube-type boiler to be produced entirely in Japan. However, Tsunekichi didn’t embark on his quest to invent the boiler until around the time he turned 40. Before this layperson, who didn’t even understand the terminology in a specialized text on boilers, would become known as “the king of boilers,” before he would earn a reputation as one of Japan’s 10 great inventors of the Meiji and Taisho periods, before he would found Takuma, he would grapple with a series of difficulties that he was only able to overcome through a long process of trial and error.

+ Childhood and youth

Tsunekichi was born on February 8, 1872, in the village of Omakoto in the Tohaku district of Tottori Prefecture (the present-day town of Hokuei in the Tohaku district). Skilled with his hands and an avid student from his youngest days, Tsunekichi diligently studied classical Chinese under his father, who ran a small private school. He had an older brother named Manzo and an older sister named Yone. Having heard about steam-powered vehicles and other urban wonders from his brother Manzo, who was an elementary school teacher in Kyoto, the young Tsunekichi resolved to travel to the city.

After convincing his father and brother to let him go to Kyoto at age 14, Tsunekichi initially worked for a physician, but he changed his mind and decided to become a merchant around age 20. He entered the lumber trade at age 31 in 1903, but the Russo-Japanese War broke out in 1904, precipitating a rapid fall in the price of lumber and forcing him out of business. Already responsible for his wife and children, Tsunekichi tried to reestablish himself in Korea with the aid of a friend when the war ended, but sad news about the death of his wife at the time, Kameko, awaited him when he returned to Japan after planning his business in Korea.

+ Meeting his wife Kumako and encountering a boiler invention

The heartbroken Tsunekichi remarried Kumako Harimura, who found herself in the same circumstances as Tsunekichi, when he was 35.

Kumako supported Tsunekichi’s efforts at invention despite the household’s limited means; without her help, the Takuma boiler would probably never have come to be. The supportive wife is shown in profile on a bust of Tsunekichi that was made after he achieved success.

Yet another encounter awaited Tsunekichi after he remarried Kumako and relaunched his lumber trading business: Yasaburo Okamoto, who would later push him down the path toward inventing a boiler.

Yasaburo was working to invent a boiler as a source of power to operate lumbermill machinery. Tsunekichi was enthralled when he heard about the proposed invention and invested in the Okamoto boiler. The project, launched around the time that Tsunekichi was 38 years old, failed, leaving Tsunekichi and his wife with an enormous debt.

Tsunekichi and his wife, Kumako

A bust of Tsunekichi with his wife Kumako shown in profile on the side

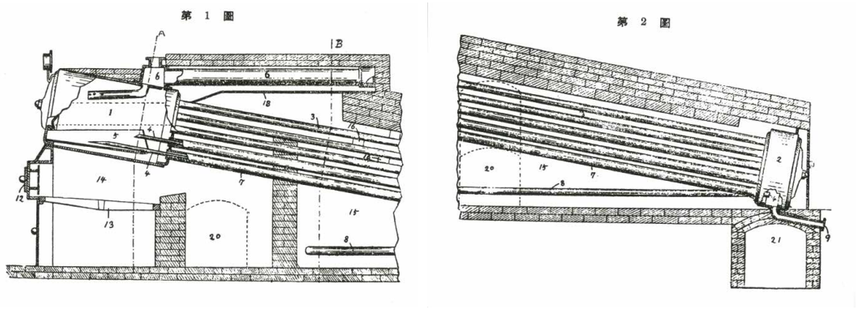
+ “If you put your mind to it, you can do it”: A eureka moment on the Genkai Sea

Drowning in debt from his failed business and with his family on the verge of breaking up, Tsunekichi boarded a ship with the intention of turning once more to his Korean friend. One night on the ship as it crossed the Genkai Sea, Tsunekichi became overcome by the distressed condition in which he and his family found themselves and contemplated throwing himself into the sea.

Just before doing so, he had an experience that he would later describe as a “revelation from heaven.” In that moment, he had an epiphany concerning the driving force behind the love of invention that he had cultivated throughout his life, realizing that communicating the fruits of his work to the world and contributing to human progress were the heaven-sent mission of humanity and simultaneously the greatest joy that one could have, and resolving that if he put his mind to the task, he would be successful.

Following his return to Japan, Tsunekichi repaid the loan from his failed business, and in 1912, he overcame the opposition of those around him to start work on inventing his own boiler at the age of 40.

✚ “Boilers are living things”: Tsunekichi’s boiler research



Tsunekichi, who knew nothing about boilers, bought several specialized books on the subject and set about developing his own design while drawing inspiration from designs that were famous overseas at the time, including Cornish boilers and Babcock boilers. Despite a sustained effort that was supported by Kumako, the process did not go as he had hoped.

But he didn’t give up, instead retreating from prying eyes to Mt. Takatori in the city of Kobe in Hyogo Prefecture, where he immersed himself in his research and pursued a series of hunches: that boilers were living things; that they used heat from coal to convert water into steam; that the circulation of boiler water in order to create steam from water was instrumental to the life of the boiler; that the movement of boiler water was analogous to the circulation of blood in the human body; and that boilers to date did not adequately provide the functionality of the human heart, because the part corresponding to the arteries was incomplete.

Tsunekichi tried to conduct experiments involving the circulation of boiler water, but he was unable to build a model due to the difficulty of obtaining funding. Instead, he carried out experiments using a model he had made out of implements he found in his kitchen, including pots, glass sake utensils, and a device used to toast sesame seeds. In the course of doing so, he established a theory of boiler water circulation. The water collector, which was the heart of the boiler, and the downcomer tubes, which were its arteries, together comprised the distinguishing characteristics of the Takuma boiler and were inventions that were unknown in the water tube-type boilers of the day. In this way, Tsunekichi patented the Takuma boiler in 1913 and set out to found a company so that he could supply his invention to the world.

✚ The history of Tsunekichi and Takuma

In April 1914, Tsunekichi exhibited his Takuma boiler at the 2nd Invention Expo in Osaka, where he won the gold prize. It was the first time for the exceptional nature of the invention to be recognized in a public setting, prompting inquiries from all quarters as the inventor began work to commercialize his product.

Eager to capitalize on the newfound opportunity, Tsunekichi enlisted the support of Dr. Masao Kamo of Tokyo Imperial University and signed a sales contract with Takada Shokai that November, prompting sales to grow smoothly. The following year, he established Takuma Boiler Company to protect his patent rights.

The superiority of the Takuma boiler was proven in a capacity test carried out by Kyoto Imperial University in 1919, pitting the design against the Babcock sectional boiler, a design from the Babcock & Wilcox Company in England that had earned worldwide renown. Results showed that the Takuma design bested its British counterpart in terms of both steam volume and thermal efficiency.

The company began selling Takuma boilers in Manchuria in 1924 and in Taiwan in 1926. At the time, sugar refineries in Taiwan were looking for a high-efficiency boiler that burned bagasse (a fibrous product left over after sugarcane is pressed). When performance tests carried out by sugar refineries in Taiwan and other sugar plants made it clear that Takuma boilers excelled at this task, the company experienced a surge of inquiries. Between 1930 and 1932, it delivered dozens of boilers to the market.

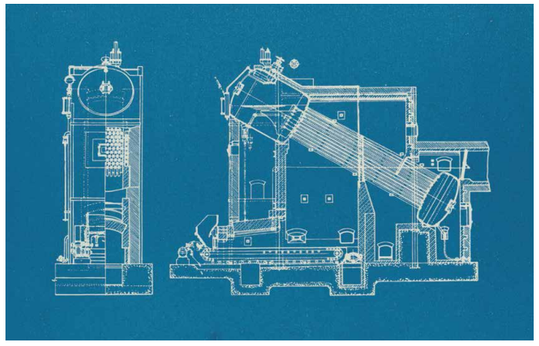
In November 1928, Tsunekichi was awarded the Fifth Class Order of the Sacred Treasure by Emperor Hirohito in recognition of his contribution to new industry. In addition, he was named as one of the Meiji and Taisho periods’ 10 greatest Japanese inventors in December 1930. He was 58 years old at the time.

✚ Tsunekichi’s second challenge: From the Takuma boiler to the Tsunekichi boiler

Praise for the Takuma boiler grew, and production value approached 10 million yen, unadjusted for inflation. Buoyed by brisk sales of his first invention, Tsunekichi founded Tsunekichi Takuma Institute at his home in June 1936 and set out inventing a new boiler. He dubbed the premium, compact boiler that resulted from his effort the Tsunekichi boiler. Easy to operate, faster-starting than other boilers of the time with the same steam volume, and capable of running on about 30% less fuel, the new design earned broad praise. Faced with the need to put in place a system capable of producing the boiler, Tsunekichi incorporated his institute as a joint-stock company in July 1937, creating the Takuma Institute Co., Ltd. The groundwork for the boiler-inventing business that Tsunekichi had long idealized had finally been laid.

As a result of the Marco Polo Bridge Incident on July 7, 1937, Japan abruptly found itself embroiled in the Sino-Japanese War. As the war expanded, the Takuma Institute, which had been founded to carry out research into boilers, became caught up in wartime production.

A band performs to accompany the first shipment of the Tsunekichi Model A boiler.



Schematic drawing of the Tsunekichi Model A boiler

✚ Establishment of Takuma Boiler Manufacturing Co., Ltd., and adoption of the company motto

Takuma Boiler Manufacturing Co., Ltd., the forerunner of today’s Takuma, was founded in the city of Amagasaki in Hyogo Prefecture in June 1938 to boost the institute’s production capacity. The new company absorbed the Takuma Institute that December. Tsunekichi served as the company’s first president and formulated its motto of “Service to the nation through boiler manufacturing.” Founded on the idea of contributing to society and the environment through the manufacture of boilers, the philosophy captures the dedication of Tsunekichi, who poured his heart and soul into inventing the first water tube-type boiler to be produced in Japan, and it continues to serve as the foundation of Takuma and the Takuma Group’s management philosophy today.

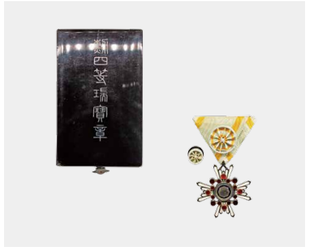
Takuma Steam Power Construction Co., Ltd., was founded in March 1939 to install and operate boilers, and the company’s Tokyo Office was spun off in September 1941 to form Tokyo Steam Power Construction Co., Ltd., (today’s SUNPLANT Co., Ltd.). The result was a three-part business that added installation to boiler research and manufacturing.

A share of Takuma Boiler Manufacturing Co., Ltd., stock at the time the company was founded

The company emblem, whose design incorporates Takuma’s three-part business

+ Tsunekichi's later years

A sesame-toasting device used in boiler water circulation experiments along with a corresponding sketch

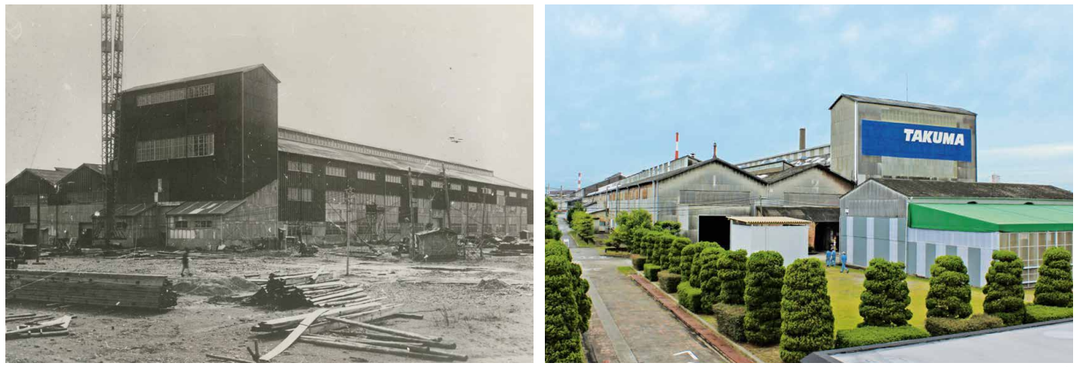


Order of the Sacred Treasure, Gold Rays with Rosette (junior fifth rank)

Tsunekichi worked hard as the president of Takuma Boiler Manufacturing Co., Ltd., until he resigned from the position in May 1941 at the age of 69 due in part to his advancing age. He gave the post to Yoshisaburo Fujita, with whom he had shared many joys and sorrows since before the founding of the company, and became chairman, in which capacity he watched over the company during the chaos of World War II and its aftermath. He continued in that role after the death of his wife Kumako at age 82 in March 1947 until passing away at age 81 on December 22, 1953.

On January 14, 1954, one month after his death, Tsunekichi was posthumously awarded the Order of the Sacred Treasure, Gold Rays with Rosette, for his contributions to the development of Japanese industry through his boiler business. The company still has the award itself along with the sesame seed toaster and sketches he used in his experiments with boiler water circulation and a coat worn by his wife, treasured artifacts of its history.

+ Passing on boiler manufacturing technology and dedication at the Harima Plant



The Harima Plant at the time of its construction (left), and the same plant today (right)

Tsunekichi set out on his path to invention as a layperson who knew almost nothing about boilers and went on to invent the Takuma boiler as well as the Tsunekichi boiler. Boiler manufacturing technology has placed an essential role in facilitating the development of these boilers down to the present day by making it possible to manufacture the boilers invented and designed by Tsunekichi without sacrificing their quality and to deliver them to customers via a rigorous quality control system. No matter how exceptional Tsunekichi's designs, it would not be possible to earn customers' trust without the ability to actually build them, and the inventor's own experience led him to pay close attention to this aspect of the company's operations.

The Harima Plant, which was established in December 1942 by Tsunekichi to implement his ideal of "Service to the nation through boiler manufacturing," continues to operate today as one of Takuma's boiler manufacturing facilities. Many of the boiler manufacturing technologies that comprise the company's core competence find expression in the skills of the plant's engineers, and we consider passing on and further developing those skills to be essential priorities.

As they manufacture boilers to deliver to Takuma's plant under a rigorous quality control system, veteran employees and young workers at the Harima Plant work together to master and pass on technologies in accordance with the same philosophy that has guided us since our founding.

Sources

Autobiography of Tsunekichi Takuma: From His Personal Background to the Takuma Boiler (2005), Takuma Co., Ltd.

Fifty Years of Takuma (1989), Takuma Co., Ltd.

Great Inventors of Japan (1943), Michio Matsudaira, Kinnohoshisha

Life of an Inventor: The King of Boilers, Tsunekichi Takuma (1940), Tadashi Kawamura, Fujokaisha

Afterword

Ryo Inaba, General Affairs Department, Corporate Services Division

Although the word inventor calls to mind an image of someone who embraces the mission of creation at a young age and then finds success, Tsunekichi Takuma set out to invent the boiler around the time he turned 40, when he was a lumber merchant. The boiler and incineration technologies into which this unusual person poured his heart and soul live on as core technologies of the company today. I hope that this feature has given you a better understanding of the source of Tsunekichi Takuma's passion for boilers as the "King of Boilers."

Chiyo Inoue, Manager, General Affairs Department, Corporate Services Division

What kind of person was Tsunekichi Takuma? He was full of curiosity and the will to study as a child, and he struggled with a desire to accomplish something with his life as a youth. A reading of his autobiography reveals an energetic journey over the course of which he developed a strong desire to control nature while experiencing numerous challenges and failures and making the impossible, possible. In the episodes of his life that were not include in the autobiography you can find the same sort of human drama that characterizes life during other eras, including times of happiness and sadness through friendship, love, betrayal, trust, disappointment, and hope. It turns out that the portrait of the old man with which employees are familiar points to a passionate spirit who lived 100 years ago.

1. Municipal Solid Waste Treatment Plant Business

(Related SDGs)

+ Seeing municipal solid waste treatment plants through to completion

Takuma is helping protect the global environment through business activities consisting of an integrated approach that extends from the design, manufacture, and procurement of equipment and systems to plant construction. This section introduces the process that goes into bringing a municipal solid waste treatment plant online in one of Takuma's core businesses.

1 Sales

During the sales stage, we precisely assess the needs of the local government that is our customer. Working with our in-house planning team, we develop a proposal that will satisfy the customer and work to earn an order.

2 Planning and cost estimation

During the planning and cost estimation stage, we plan plant systems (including equipment flow, specifications, and layout) to satisfy the customer's needs. We then focus our technological capabilities on those needs and offer the proposal along with an optimally priced quotation.

Bidding

Order receipt

3 Design

During the design stage, we develop a detailed design through a series of meetings with the customer based on the basic plan. Specialists in technologies such as combustion, exhaust gas treatment, and electric instrumentation systems work together to create a specific solution for the customer.

4 Procurement and manufacturing

Waste treatment plants consist of multiple pieces of equipment. During the procurement and manufacturing stage, we manufacture this equipment at our Harima Plant under a rigorous quality control system while carefully choosing the optimal manufacturers to satisfy the project's cost and lead time requirements.

5 Construction and commissioning

During the construction and commissioning stage, we manage the construction process, from civil and construction work to the installation and commissioning of plant equipment. This management process, which addresses safety, quality, construction process, and cost management, culminates in the delivery of the completed facility to the customer.

Completion and acceptance

6 After-sales service

We carry out periodic inspections and maintenance after the plant has been handed over to the customer in order to ensure it will operate safely over the long term. In recent years, an increasing number of customers are turning to Takuma for turnkey solutions that extend from the construction of new facilities to their operation.

Impressions from employees who worked on the Imabari New Waste Treatment Facility maintenance and operation project

Takashi Kubo

Plant Sales Department 2
Environmental Plant Division

As a salesperson, I visited the site numerous times to ensure that the customer would choose to entrust the project to Takuma. The process leading up to our receipt of the order was a truly challenging one.

This effort had numerous components, including precisely assessing the customer's needs; proposing a project that would satisfy those needs; building relationships of trust with the customer, local residents, and others; coordinating and negotiating with in-house teams and outside entities; negotiating with other companies; and dealing with various problems as they arose. Our hard work was rewarded and turned into immeasurable pleasure when the customer made the following response on a customer satisfaction questionnaire after the project was completed and handed over: "I believe that we've just seen one of the best facilities of its kind in Japan completed."

Nobuo Akae

Environmental Engineering Department 3
Engineering Center

My involvement with this project began as we sought to work out the system that Takuma was going to propose after we received the order for the project while listening carefully to the customer's requests. As an example, we ended up changing equipment that uses waste heat from incinerating waste at the facility from a hot water supply system to an electricity supply system after a series of discussions with involved agencies and other stakeholders so that the plant could supply the electricity it generates to nearby facilities.

After the basic design was finalized, we were able to design a facility that earned the customer's approval by explaining information including the capacity, operating methods, and maintenance methods for all machinery and participating in numerous meetings.

The process leading up to the transfer of the facility to the customer brought one challenge after another, and I'll strive to take advantage of those experiences so that we can continue to deliver facilities that make customers happy in the future.

Kenji Fujita

Civil & Architectural Engineering Department
Construction Center

Expert staff members manage operations at each construction site on a daily basis to ensure that the facility will be completed as outlined in design drawings and in a way that satisfies the customer.

As many as more than 500 workers worked on this plant's site every day. Daily construction management included safety patrols to ensure that workers were doing their jobs safely and a variety of inspections to verify that the plant was being built in accordance with drawings.

We also actively promoted exchanges with local residents to ensure they understood the construction process and to give them peace of mind, for example by inviting them to tour the site, by cleaning up the area around the site, and by participating in community events.

I realized that all the hard work was worth it when the customers' representatives expressed their gratitude at the completion ceremony after construction was finished.

Yasushi Kamei

Operation & Maintenance Services Department 2
Environmental Plant Division

When operating a plant, we provide optimal maintenance and management services that utilize POCSYS, a proprietary system designed to provide comprehensive support for plant operation, maintenance, and management so the plant can live up to its concept of providing safe and stable waste treatment.

Going forward, we will go beyond plant operation, maintenance, and management as we work to allow the facility to bring local residents together and to play a disaster prevention role by offering tours, hands-on events, and disaster prevention training together with local residents. In this way, the facility will protect the community and earn a place in residents' hearts while simultaneously raising environmental awareness, facilitating hands-on learning, and disseminating information.

1. Municipal Solid Waste Treatment Plant Business

+ Main Recent Projects

The following are the main plants supplied by Takuma during FY2017.

●New construction

Uwajima Public Association Environment Center

- **Project name**
  Regional New Waste Treatment Facility Construction Project (tentative)
- **Capacity**
  Incineration facility: 120 tons per day (60 tons per day × 2 units)
  Recycling facility: 20 tons per day for 5 hours
  Power output: 2,500 kW
- **Location**
  Ehime Prefecture

Hanno City Clean Center

- **Project name**
  Hanno Waste Treatment Facility Construction Project
- **Capacity**
  Incineration facility: 80 tons per day (40 tons per day × 2 units)
  Recycling facility: 11.8 tons per day for 5 hours
  Power output: 830 kW
- **Location**
  Saitama Prefecture

Imabari City Waste Management Center

- **Project name**
  Imabari New Waste Treatment Facility Maintenance and Operation Project
- **Capacity**
  Incineration facility: 174 tons per day (87 tons per day × 2 units)
  Recycling facility: 41 tons per 5 hours
  Power output: 3,800 kW
- **Location**
  Ehime Prefecture

●Primary equipment improvements

Chiyoda Clean Center

- **Project name**
  Okitama Administrative Association Chiyoda Clean Center Incineration Facility Primary Equipment Improvement Project
- **Capacity**
  Incineration facility: 255 tons per day (85 tons per day × 3 units)
  Power output: 2,150 kW
- **Location**
  Yamagata Prefecture

2. Energy Plant Business

(Related SDGs)

+ Seeing energy plants through to completion

This section introduces the process that goes into bringing an energy plant online in one of Takuma's core businesses.

1 Sales

During the sales stage, we gather information about the business being planned by the customer, conduct a series of discussions and studies with internal departments, develop a proposal that precisely meets the customer's needs, and work to earn an order.

2 Planning and cost estimation

During the planning and cost estimation stage, we plan a plant system (flow, layout, equipment specifications, etc.) that will satisfy the customer's needs and create a competitive proposal.

Order receipt

3 Design

During the design stage, specialists from various fields, including combustion technology, exhaust gas treatment, and electrical control systems, work together to develop a detailed plan.

4 Procurement and manufacturing

The procurement and manufacturing stage consists of manufacturing equipment and systems whose specifications have been finalized at our Harima Plant under a rigorous quality control system and of choosing and procuring equipment from optimal venders in Japan and overseas to satisfy specifications and quality requirements.

5 Construction and commissioning

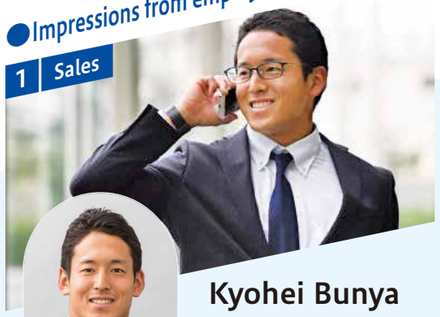
During the construction and commissioning stage, we work to ensure construction proceeds smoothly while carefully managing safety, quality, and construction processes. Once the plant has been completed, we carry out tests and inspections to assess whether equipment and systems are operating as designed and to specifications, and then we verify the plant's performance.

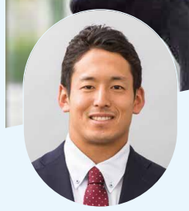
Completion and acceptance

6 After-sales service

Once the plant has been handed over to the customer, we carry out periodic inspections and maintenance to prevent problems and ensure that the plant will be able to operate in a safe and stable manner.

Impressions from employees who worked on the Biomass Power Technologies Inc. project (delivered during FY2017)





Kyohei Bunya
Section 1,
Plant Sales Department 2
Energy Plant Division

In this project, we proposed a plant capable of burning and generating electricity from a variety of fuels harvested from Japan's forested mountains in a stable manner, reflecting our desire to achieve the customer's concept of using all the trees from mountains in order to regenerate and develop the country's forested mountains. I met with the customer and various governmental offices, visited the planned construction site frequently, checked on the status of the infrastructure that would be needed for the power plant to operate, and worked to finalize the overall plan. Going forward, I will offer assistance so that the plant we proposed can operate smoothly and thereby contribute to the customer's business and to the local community.

Hiroyuki Hikita
Section 2,
Energy Engineering Department 2
Project Center

We refine each plant's plan through repeated meetings with our sales team and with the customer. While listening to the customer's wishes, we offer a proposal that incorporates our expertise and work closely with the sales team to earn an order. Once we've received that order, we proceed with the plant design process while enlisting the cooperation of the customer, public agencies, equipment manufacturers, and others. The completed design drawings are handed off to our construction team, and once construction is completed, the engineering staff works with the commissioning team to carry out inspections, offer instruction on plant operation, and perform related tasks. Seeing the customer's personnel working at the operating plant following its completion always gives me a strong sense of how we're contributing to the customer's business.

Naoki Hara
Section 1,
Construction Department (Osaka)
Construction Center

I was involved with this wood chip biomass-fueled power plant installation project, which is Takuma's first 2 MW-class power plant, as a site manager from the construction planning stage through to construction and completion of the facility. We worked especially hard to stick to the schedule, first, due to the project's short six-month timeline, which included four months for construction and two months for commissioning, and second, because it didn't differ from a large power plant in terms of the number of pieces of equipment, even though it was only a 2 MW-class facility. Thanks to the cooperation of the customer and other involved parties, we were able to complete the project on time. I hope the plant will be able to promote local employment and help revitalize the forestry industry by using unused lumber.

Fumitoshi Takahashi
Section 2,
Plant Service Department 2
Energy Plant Division

Although the plant has only been operational for a short time, we as a maintenance team will plan periodic inspections and maintenance and carry them out safely so that the facility can operate in a stable manner over the long term.

We'll also help increase the customer's profitability by maintaining a high level of performance with functional improvements and proposals for preventive maintenance measures and other enhancements that take advantage of our many years of experience and by eliminating unplanned stoppages.

2. Energy Plant Business

+ Main Recent Projects

The following are the main plants supplied by Takuma during FY2017.

●Energy plants

Chugoku Mokuzai Co., Ltd. Head Office Plant

- **Project name**
  Chugoku Mokuzai Biomass-fueled Power Plant (Head Office) Construction Project
- **Capacity**
  Fuel: Wood fuel
  Steam conditions (normal operation):
  42 tons per hour × 6.0 MPaG × 460°C
  Power output: 9,850 kW
- **Location**
  Hiroshima Prefecture

SGET Green Power Sanjo Godo Kaisha

- **Project name**
  Biomass Power Plant Construction Project
- **Capacity**
  Fuel: Wood fuel
  Steam conditions (normal operation):
  28 tons per hour × 6.0 MPaG × 425°C
  Power output: 6,250 kW
- **Location**
  Niigata Prefecture

Pultec Energy Co., Ltd.

- **Project name**
  No. 5 Biomass Power Generator Installation Project
- **Capacity**
  Fuel: Wood fuel, PKS
  Steam conditions (normal operation):
  85 tons per hour × 6.0 MPaG × 480°C
  Power output: 22,100 kW
- **Location**
  Hyogo Prefecture

DS Green Power Generation Yonezawa LLC.

- **Project name**
  Biomass Power Plant Construction Project
- **Capacity**
  Fuel: Wood fuel
  Steam conditions (normal operation):
  28 tons per hour × 6.0 MPaG × 425°C
  Power output: 6,250 kW
- **Location**
  Yamagata Prefecture

Biomass Power Technologies Inc.

- **Project name**
  Biomass Power Technologies Inc. Matsusaka Woody Biomass Power Plant Installation Project
- **Capacity**
  Fuel: Wood fuel
  Steam conditions (normal operation):
  11.4 tons per hour × 4.2 MPaG × 405°C
  Power output: 1,990 kW
- **Location**
  Mie Prefecture

Ehime Forest Generation, LLC

- **Project name**
  Matsuyama Biomass Power Plant Construction Project
- **Capacity**
  Fuel: Wood fuel, PKS
  Steam conditions (normal operation):
  48.5 tons per hour × 6.0 MPaG × 480°C
  Power output: 12,500 kW
- **Location**
  Ehime Prefecture

●Industrial waste treatment plants

Shin nihon kaihatsu Co., Ltd.

- **Project name**
  No. 5 Incinerator Construction Project
- **Capacity**
  Treated waste type: Industrial waste
  Incineration capacity: 93.6 tons per day
- **Location**
  Hyogo Prefecture

Kurihalant Co., Ltd.

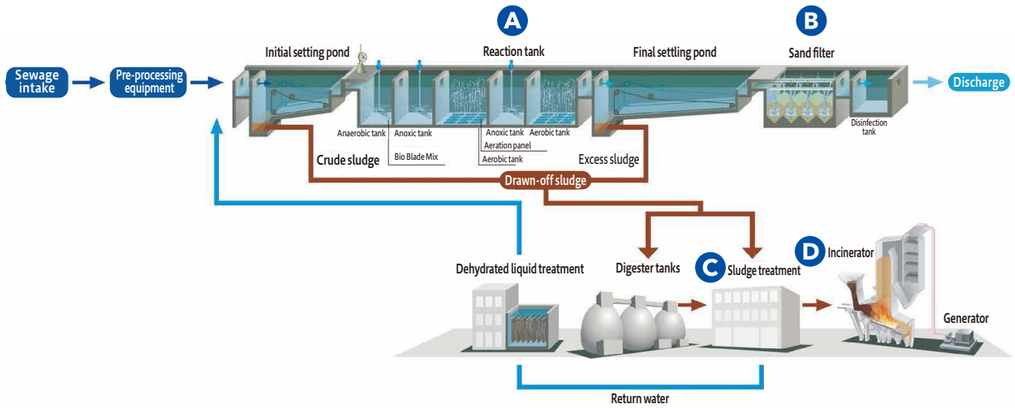
- **Project name**
  Daigo Biomass Power Plant Construction Project
- **Capacity**
  Fuel: Wood fuel
  Steam conditions (normal operation):
  11.4 tons per hour × 4.2 MPaG × 405°C
  Power output: 1,990 kW
- **Location**
  Ibaraki Prefecture

3. Water Treatment Plant Business

(Related SDGs)

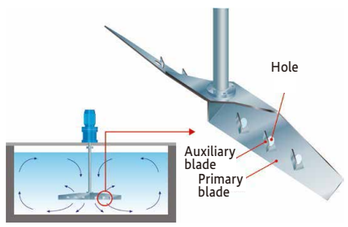
More than 50 years have passed since Takuma entered the water treatment business. To date, we have helped improve the water environment by building water treatment facilities. Recently, the industry has been called upon not only to improve the water environment, but to reduce the amount of power that treatment equipment consumes and to create energy from sludge.

Energy-saving and energy-creating products play key roles in the industry, particularly at sewage treatment plants, and we remain committed to helping realize sustainable sewage systems.



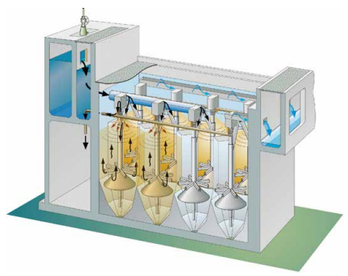
A Reaction tank facility — Saving energy

【Principal equipment】
Aeration systems
Low power agitator
(Bio Blade Mix)



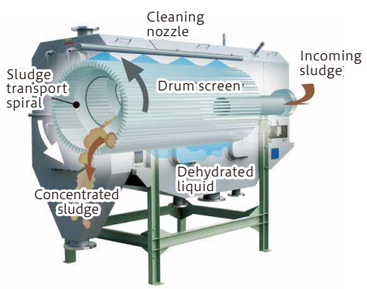
B Rapid filtration facility — Saving energy

【Principal equipment】
Upflow moving-bed filtration
(Uniflow Sand Filter)



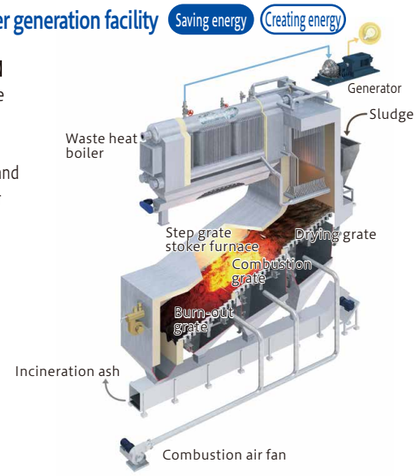
C Sludge treatment facility — Saving energy

【Principal equipment】
Rotating drum-type concentrator



D Sludge-fueled power generation facility — Saving energy — Creating energy

【Principal equipment】
Step grate stoker furnace sewage sludge power generation system
(Step grate stoker furnace and innovative step grate stoker furnace)



+ Main Recent Projects

The following are the main facilities supplied by Takuma during FY2017.

Tarumi Sewage Treatment Plant

- **Project name**
  Tarumi Sewage Treatment Plant Sand Filter Machinery and Equipment Project
  (Sand Filter Machinery and Equipment Renovation Project)
- **Capacity**
  Treatment volume: 7,992 m³ per day
  Treatment method: Upflow moving-bed filtration (high-speed type)
  Specifications: M40 × 1 unit × 3 basins
- **Location**
  Hyogo Prefecture

Homare Sewage Relay Pumping Station

- **Project name**
  Homare Sewage Relay Pump Station Screening Equipment Renovation Project
  (Automatic Screen Renovation Project)
- **Capacity**
  Type: Back-raked continuous automatic screen
  Specifications: 800 (W) × 1,300 (D) mm
- **Location**
  Hyogo Prefecture

Kita-Tama No.2 Water Reclamation Center

- **Project name**
  Kita-Tama No.2 Water Reclamation Center Sludge Concentration Equipment Reconstruction Project
  (Sludge Concentrator Delivery)
- **Capacity**
  Type: Rotating drum
  Specifications: 50 m³ per hour
- **Location**
  Tokyo Prefecture

4. Activities of Our Overseas Business

(Related SDGs)

+ Biomass-fueled power plant business in the Southeast Asian market

The biomass-fueled power generation boiler business in Southeast Asia is an essential part of any discussion of Takuma's history. We have delivered more than 370 biomass boilers to customers overseas, and we have an especially extensive track record since 1959 of delivering boilers fueled by bagasse (fiber remaining after sugarcane is crushed) in Thailand, where we have a local subsidiary. Takuma takes pride in having supported the Thai sugar industry for many years.

As the feed-in tariff program for renewable energy becomes increasingly well established in various industries, a growing number of customers in Thailand are looking beyond simply gaining a source of power for plant operation and instead opting to construct boilers with the goal of using 10 MPa·520°C class boilers that operate at comparatively high temperature and high pressure levels to actively generate electricity for resale to boost their income. In this way, demand for this type of boiler facility is expected to continue to grow.

Under these conditions, we look forward to helping supply environmentally friendly power from biomass, particularly in Southeast Asia, by accommodating demand not only in Thailand, but also in neighboring countries such as Indonesia and Vietnam with reliable technology and fine-grained customer service based on our extensive experience in the field.

Sugarcane deliveries

+ Main Recent Project

- **Bagasse boiler delivered in FY2017**

Steam capacity: 170 tons per hour
Steam pressure: 4.2 MPa
Steam temperature: 485°C
Number of boilers: 2

+ Message

I oversaw my first overseas project in FY2017. Overseas projects pose unique challenges because they tend to have larger boilers than domestic Japanese projects and because all interactions with the customer during the design process must be carried out in English. I was relieved that we were able to deliver this boiler plant to the customer without any issues. I'm looking forward to taking advantage of the experience I've gained from this project so that I can embrace the challenges of similar projects in the future.

Yasuyuki Kawabe

Section 3, Energy Engineering Department 2
Project Center

+ Overseas Energy from Waste plant business

Waste processing problems have been manifesting themselves in countries around the world recently due to the effects of trends such as rapid urbanization, and there have been reports of various adverse effects of burying waste as-is on living conditions, including soil pollution and fires, especially in developing nations. Such countries are pursuing initiatives to resolve waste treatment issues, and demand for Energy from Waste plants has been growing with each passing year, seemingly in proportion to the volume of waste being disposed of. Growth in construction of large-scale plants nonetheless remains gradual. One cause of this mismatch between demand and construction is likely to be inadequacies in terms of programs, financing, and technologies as expectations concerning renewable energy combine with robust requirements with regard to safety and environmental friendliness.

Takuma has deep experience and an extensive track record that together make it a market share leader in waste incineration and processing equipment in Japan. The photograph below depicts a plant that we delivered to Lakeside Energy from Waste Limited in the UK, one of a series of nine facilities we have delivered in various countries and regions, including China and the UK. Our Lakeside Plant in the UK and our Gaoantun Plant in Beijing have earned a high level of praise and trust from their respective customers, for example due to the facilities having achieved continuous operation for more than 8,000 hours a year.

We are confident that taking advantage of our extensive experience in the field, working closely with stakeholders as we share detailed information, and actively cooperating in order to solve waste treatment-related issues will allow us to better deliver plants that operate in a safe and stable manner to bring peace of mind to the residents of those countries and regions.

We look forward to contributing to initiatives designed to encourage the adoption of waste power plants in the future by drawing on the technological expertise that is our strength and partnerships with local companies and other entities to propose solutions to local needs.

+ Main Recent Project

- **Lakeside Energy from Waste Plant**

Processing capacity: 1,370 tons per day
(685 tons per day × 2 units)
Steam capacity: 95 tons per hour per unit
Steam pressure: 4.5 MPa
Steam temperature: 400°C
Power output: 36,650 kW

+ Message

Recently, I've noticed a big increase in awareness around waste issues, be it in developed or developing countries. But already for over half-a-century, Takuma has been providing environmental technology solutions by designing and building hundreds of household waste treatment facilities. As one of the few foreigners in Takuma, I'm working to bring our technology and expertise overseas and while these projects are very difficult and complicated, the resulting facilities undoubtedly help towards creating a cleaner environment for ordinary people and their communities.

Marc Nyhan

Sales Section, Environmental Plant Sales Department
International Operations Division

CSR Activities for the Future

To become a sustainable company while fostering and expanding a broader range of CSR activities, we began compiling a CSR activity roadmap in FY2011, which we have subsequently implemented over time. In FY2012, we chose a number of key issues based on international guidelines on corporate sustainability reporting published by the Global Reporting Initiative (GRI) as well as ISO 26000, an international standard on organizational social responsibility. We are currently working to resolve those issues.

Activity report for FY2017

Each department discussed CSR issues in line with those key issues and developed its own action program. At the end of the year, those departments then conducted self-evaluations to assess how well they had implemented their programs. (The table below outlines some of the results of that process.)

Future issues

Going forward, we plan to implement CSR activities using techniques that we consider appropriate while relying on guidance and advice from outside experts as we choose key issues and develop CSR issues and action programs.

The global business environment that characterizes the environmental and energy fields in which Takuma's business operates grows increasingly diverse day by day, and that environment remains one of intensifying competition. Our technological capabilities in the environmental and energy fields, which we have refined over many years of experience, form the basis of our CSR management as well as our greatest strength as we look to make a broad contribution to society. We will continue to draw on this strength in our activities going forward.

ISO 26000 core subjects	Key issue	CSR issue	Department		FY2017 action program	
					Action plan	Self-evaluation of results
Organizational governance	Corporate governance	Support for measures to increase the effectiveness of the Board of Directors	Planning Division		Conduct a questionnaire targeting directors in order to increase the effectiveness of the Board of Directors. Evaluate, analyze, and report on the results to facilitate useful discussions at Board of Directors meetings.	We conducted a questionnaire targeting directors and held interviews as necessary, evaluated and analyzed the results, and reported them to the Board of Directors.
	Compliance	Cultivation of a robust corporate culture	CSR Division		Share formulations of Takuma's basic approach, for example Management Principles, the Takuma Group Ethics Charter, and the Takuma Group Code of Conduct, and work to ensure that they permeate the organization and take hold.	We highlighted the Management Principles, the Takuma Group Ethics Charter, and the Takuma Group Code of Conduct in the CSR Report and in internal education and worked to ensure that they permeate the organization and take hold.
	Risk management	Improvement of risk management techniques	Engineering Division		Create a risk management chart for each project, identify risks, and implement preventive measures.	We were able to keep risks from manifesting themselves by applying risk criteria horizontally to each project. In addition, there were no complaints that posed a risk of reduced customer satisfaction.
		Review of risk management items in the field, evaluation and improvement of current conditions, and implementation of risk management	Construction Division		Enhance the information included in construction plans for each project by identifying risks associated with work in the field in order to eliminate accidents and disasters at construction sites, carry out audits to determine whether safety activities are being conducted according to plan, and work to implement improvements.	Although we identified risks in our safety and health plans, incorporated that information into construction plans, audited safety activities in accordance with those plans, and worked to make improvements, accidents still occurred, preventing us from achieving our goal. Going forward, we will augment guidance and education for workers with education for site managers while working to improve the safety awareness of partner businesses.
	Information disclosure (fulfillment of accountability requirements and assurance of transparency)	Appropriate disclosure of technical information to outside parties	Engineering Division		Work internally to disclose technical information in a timely and appropriate manner as a way to facilitate the announcement of such information to outside audiences.	We encouraged departments to submit ideas for presentations at meetings of major academic societies and discussed development topics that seemed suitable for presentation with the responsible departments.
	Employee training on social responsibility	Promotion of understanding (awareness) of social responsibility and recommendations of how employees can take the initiative to found their behavior on an awareness of social responsibility	Marketing Division		Have employees discuss what it means to take the initiative to found their behavior on an awareness of social responsibility internally in their own department in order to facilitate such conduct.	We held internal readings of the Takuma Group Ethics Charter and the Takuma Group Code of Conduct, worked to raise awareness of social responsibility, and sought to promote conduct that accords with ethical principles.
	Stakeholder engagement	Development of trusting relationships with customers	Engineering Division		Have employees responsible for projects being researched organize associated findings (customer evaluations) and report internally so that the entire department can study and implement countermeasures.	We completed an internal report on the results from the previous fiscal year at the beginning of the new fiscal year and presented it to the QM Committee. The evaluation of the coordinators in our department exceeded the corresponding targets.
Consumer issues	Safety and quality of products and services	Implementation of measures to address risks associated with maintenance safety and quality	Engineering Division		Share examples of problems that have occurred in the past and use that information to prevent similar issues from occurring in the future and to facilitate a rapid response in the event that they do.	We shared examples of problems that have occurred in the past at internal meetings so that similar issues could be dealt with in a confident manner.
		Improvement of construction quality	Construction Division		Work to improve construction quality by carrying out voluntary inspections in the field and strengthening checks of the status of construction management in the field by internal coordinators.	We worked to improve construction quality by carrying out voluntary inspections at all sites in the field and having internal coordinators carry out checks of the status of construction management in the field at least once a month, with the result that we had no orders of additional work due to defective construction.
Fair operating practices	Compliance with the Antimonopoly Act	Assurance of understanding of, and compliance with, the Antimonopoly Act	Marketing Division		Provide training on the provisions of the Antimonopoly Act as necessary and work to ensure that employee conduct accords with the "Regulations Concerning Management of the Pledge of Antimonopoly Act Compliance."	We offered training on the provisions of the Antimonopoly Act and worked to ensure that employees understand the "Regulations Concerning Management of the Pledge of Antimonopoly Act Compliance" and the "Regulations on Managing Contact with Competitors' Sales Departments" and that they will comply with those and other regulations.
	Fair business relationships with customers and business partners	Observance of fair trade practices with customers	Marketing Division		Provide training on topics such as preventing bribery and work to ensure an awareness of the importance of compliance permeates the department.	We offered training on topics such as preventing bribery and worked to ensure an awareness of the importance of compliance permeates the department while carrying out fair business practices with customers.
		Observance of fair trade practices with suppliers and other business partners	Procurement Division		Host regular training sessions on basic contracts to increase individual employees' awareness.	We held a workshop but did not verify employees' understanding by creating a test, so we will hold another workshop next year and gauge understanding with a test.
	Respect of property rights	Protection and utilization of intellectual property rights	Engineering Division		Offer training related to intellectual property rights to improve and maintain employees' awareness of the importance of protecting those rights.	We held a course on patent basics for new employees as part of new-hire training in an effort to increase employees' knowledge and awareness.
Labour practices and human rights	Appropriate employment relationships and labor conditions (including safety and health, social dialog, etc.)	Encouragement of diversity	Human Resources Division		Host information sessions about the company for female college students.	We held an information session for female college students and had female employees visit a university laboratory to speak to students.
	Employee skill development (skill enhancement)	Development of additional skills and expertise in making proposals	Marketing Division		Work to improve the skills of department employees tasked with responsibilities in this area by offering training to improve those skills and sharing skills and expertise.	We worked to share proposal expertise and information about topics such as the latest technologies by holding internal lectures as necessary.
		Training and skill development for employees	Construction Division		Summarize concerns arising during product inspections and commissioning along with measures taken in response on internal memos, share the information with department employees at internal meetings and other gatherings, and disseminate it to other involved departments.	We spread information about quality control problems and examples, encouraged employees to prevent recurrences through monthly internal meetings, and increased plant quality by spreading information about problems that have occurred during commissioning.
Environment	Development of structures for managing environmental considerations and reduction of environment impacts	Compliance with environmental laws and regulations	Manufacturing Division		Patrol company sites while offering guidance in order to ensure that no vehicles are left idling.	The number of violations fell from the previous fiscal year, indicating that the practice of turning off the engines of parked vehicles has become established as habit.
	Contributions to resolving environmental problems	Implementation of initiatives to reduce environmental impacts	Engineering Division		Formulate and propose plans for new technologies and businesses that would allow us to help reduce environmental impacts in the environmental and energy fields while differentiating ourselves from competitors in the same industry.	Although we achieved our goal, we will work to develop plans that will enable us to make a greater contribution to the environment.
Community involvement and development	Contribution to society	Contribution to the communities around our worksites	General Affairs Division		Help improve the environment in nearby areas by carrying out clean-up activities in areas near worksites.	We helped improve the environment in the nearby area by carrying out clean-up activities in areas near worksites.

Group Company CSR Topics

This section introduces messages from the presidents of major Takuma Group companies describing issues they have identified in the course of pursuing CSR activities and how they are working to address them.

Takuma Engineering Co., Ltd.

- Established September 11, 1969
- Businesses Design of waste treatment plants, water treatment plants, energy plants, and general-purpose boilers
- Employees 50 (as of March 31, 2018)

Message from the President Yoshihito Fukuma

We're involved with designing industrial machinery that helps protect the environment and save energy. Since we believe human resources are the most important management resource in design operations, our CSR activities are focused on improving employees' skills and ensuring that they can make the most of those abilities.

We're working on a companywide basis to facilitate open communication, to develop the habit of taking the initiative to improve the way things are done, and to put in place an environment that makes it easy for employees to do their jobs. We're also trying to create novel products by valuing individual employees' ideas and maintaining diversity.

Takuma System Control Co., Ltd.

- Established April 13, 1994
- Businesses Development of computer software
  Design, manufacture, sale, construction, and management of electrical control systems
- Employees 24 (as of March 31, 2018)

Message from the President Norito Uchiyama

As a member of the Takuma Group, we manufacture plant control systems for use in waste treatment and develop and produce application software.

Our goal is to create a better tomorrow by harnessing the extensive expertise we've developed to date so that we can creatively accommodate a variety of changes in the business environment and customer needs and thereby achieve sustained growth.

Our employees are committed to working together to develop along with customers and to create products that satisfy all stakeholders so that we can help create a rich and satisfying society that is also environmentally friendly through our business activities.

Kankyo Sol-Tech Co., Ltd.

- Established April 5, 2000
- Businesses Measurement and analysis of environmentally hazardous substances (dioxins, asbestos, wastes, trace substances, etc.) and general environmental measurement and testing
- Employees 45 (as of March 31, 2018)

Message from the President Kiyomitsu Ikawa

We carry out environmental analysis and testing on a contract basis, and our reports play an important role in the precise assessment of environmental conditions. Recognizing the importance of that responsibility, we endeavor to do our jobs in a fair and appropriate manner by maintaining state-of-the-art equipment, training employees in specialized skills and technologies, helping them earn associated qualifications, and ensuring that they acquire and share knowledge about related laws and regulations. In this way, we strive in a sustained manner to maintain and improve the quality of our services and to comply with norms of conduct.

We've earned certification under international standards such as ISO/IEC 17025 to assure the reliability of the calibration services we provide, and we look forward to continuing to support the development of a sustainable society and to consistently offering reliable calibration service of the highest caliber.

Energy Mate Co., Ltd.

- Established June 27, 2001
- Businesses Onsite energy services for package boilers and solutions-related businesses
- Employees 8 (as of March 31, 2018)

Message from the President Hiroaki Nanjo

Our company was founded with a core business of offering comprehensive onsite energy services for consumer cogeneration and boiler products. Our goal is to provide ideal energy and cogeneration (solutions that provide both heat and electricity) to stakeholders, and since 2005 we have also operated a steam supply business using biomass boilers. We work around the clock to help prevent global warming together with the site users who are our customers. Our CSR activities consist of offering services that let us contribute to customers' businesses by meeting needs in a fine-grained manner while verifying system effectiveness.

Taiden Environtech Co., Ltd. (Taiwan)

- Established January 26, 1988
- Businesses Maintenance of waste treatment and other facilities
- Employees 15 (as of March 31, 2018)

Message from the Chairman Yasuo Takamatsu

Taiden Environtech Co., Ltd., is helping protect and improve the environment in Taiwan by offering maintenance for waste incineration plants on the island. We're working to provide safe, confidence-inspiring service based on extensive experience to meet the expectations of customers and all other stakeholders and to provide optimal equipment maintenance so that the waste incineration plants we maintain will perform to specifications over the long term.

Siam Takuma Co., Ltd. (Thailand)

- Established August 6, 2002
- Businesses Sale of energy and environment-related plants, sales of parts for the same plants and after-sales service
- Employees 19 (as of March 31, 2018)

Message from the Managing Director Masahide Okamoto

Are we a reliable company for customers, business partners, employees, and other stakeholders? I believe that answering this question lies at the heart of CSR. Particularly when operating overseas, companies are called upon to engage in business activities that are founded on an understanding on each country's unique laws, culture, and characteristics. Acting with responsibility based on adequate preparations and fulfilling accountability with regard to those activities are essential in order to be reliable, and we will strive to live up to all of our responsibilities as a member of the Takuma Group.

Corporate Governance

+ Corporate Governance

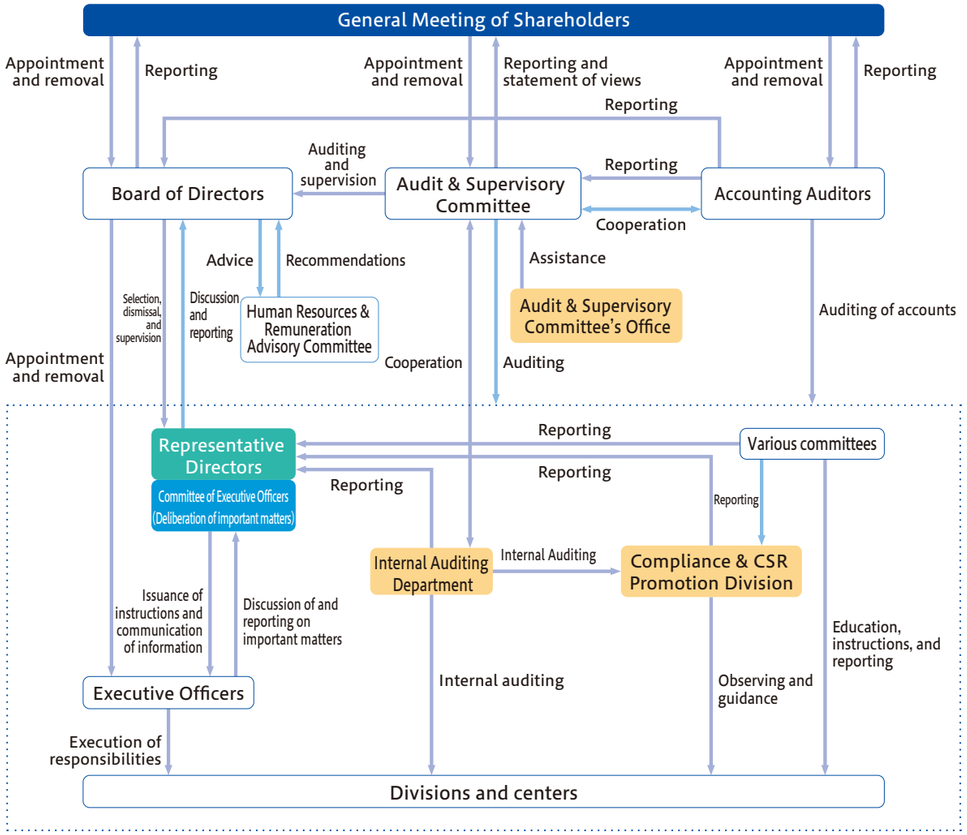
As of June 27, 2018, the Board of Directors was comprised of six directors (excluding directors who are members of the Audit & Supervisory Committee) and four directors (of whom three were outside directors). The Board of Directors meets regularly once a month as a rule and whenever else it is necessary to make decisions about important issues related to business management and issues established by law and ordinances, as well as to oversee the execution of the directors' duties.

In order to accelerate management decision-making and clarify where management responsibilities are placed, we have adopted an operating officer system in which we appoint operating officers who are entrusted with the responsibility of executing our business activities. As of June 27, 2018, there were 14 operating officers (including those who also serve as directors). Moreover, we have also established a Committee of Executive Officers, which is chaired by the president/chief operating officer, as an organization that deliberates matters that are brought up at meetings of the Board of Directors and other important issues related to the execution of our business activities. This committee communicates and provides direction about items decided by the Board of Directors and other important items related to the execution of our business activities appropriately to the divisions that are to execute them.

An Audit & Supervisory Committee that consists of four members, of whom three are outside directors, is responsible for accounting and operational audits. Members of the committee attend important meetings, including those of the Board of Directors and the Committee of Executive Officers, and they strive to understand and observe the status of business execution in a timely and appropriate manner. Drawing on their professional background and experience, they express their opinions as necessary from an objective perspective, and they conduct strict auditing of the business execution performed by the directors.

To facilitate the effectiveness of audits carried out by the Audit & Supervisory Committee, the president holds regular meetings with committee members to ensure good communication, and we have established an Audit & Supervisory Committee's Office to provide staff to help carry out the committee's work.

In addition to the above, we have established a Human Resources & Remuneration Advisory Committee comprised of independent officers, representative directors, and the officer in charge of human resources. The committee works to increase transparency and objectivity in the selection of candidates for director and operating officer positions and in the determination of compensation as well as to enhance the supervisory function of the Board of Directors.



Corporate governance structure (As of June 27, 2018)

+ Internal Control

Takuma has adopted a Basic Policy for Establishment of an Internal Control System (the full text is available on our website) in accordance with the Companies Act. We continue to review and improve this policy in response to changing circumstances.

Working towards thorough compliance, Takuma built a compliance promotion organization in FY2006 in order to continuously implement enlightenment and educational activities that make corporate ethics, related laws and ordinances, and internal rules fully understood. To control the danger of loss, we have also prepared a "Risk Management Code" that determines the person in charge of each risk, and we set up our risk management organization according to that Code. When the unexpected occurs, emergency headquarters are established with the company president as the director in charge of risk management, and an organization is put in place in order to minimize and prevent further damage through prompt action.

Internal control, constructed and evaluated in order to report on and prevent misstatements in our financial reporting, is based on the Financial Instruments and Exchange Act. This internal control on financial reporting for the Group has resulted in reports that indicate this system has been effective.

In this way, we will continue to work in the future to ensure thorough compliance while carrying out business properly and efficiently while also deepening risk management.

+ Compliance & CSR Promotion Structure

Led by the department in charge of compliance and CSR promotion (CSR Department), Takuma aims at encouraging that activity through the Compliance & CSR Promotion Organization that was installed for the purpose of enabling compliance and CSR to concretely permeate company-wide through an in-house organization.

This organization is composed of a chairman (the Executive Manager of the Compliance & CSR Promotion Division), a secretariat (positioned in the CSR Department), and an executing organization in each division, center, and department.

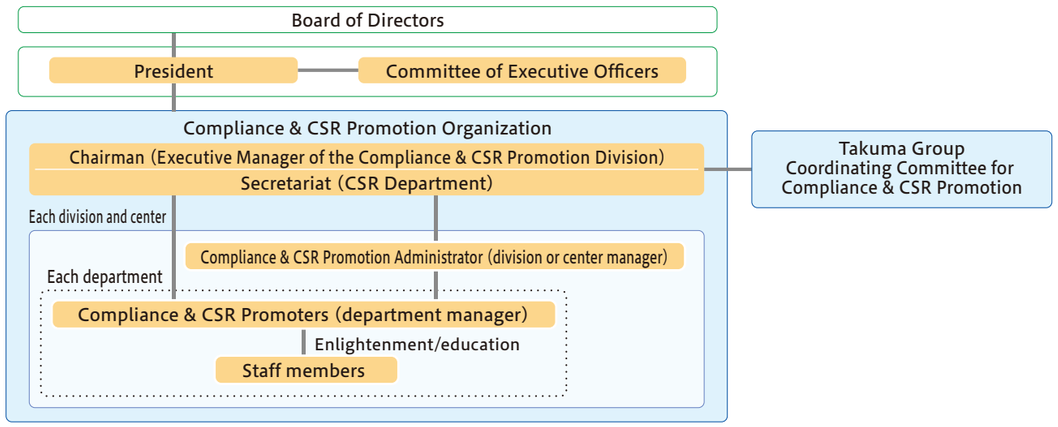
As the person in charge of promoting compliance and CSR in his or her division, each division or center manager is appointed as a Compliance and CSR Promotion Administrator. As persons who implement awareness and education in compliance and CSR in their respective departments, department managers are appointed as Compliance and CSR Promoters.

The meetings conducted within this mechanism include regular meetings and departmental meetings.

Regular meetings are held once a year. The person in charge of promotion receives reports on the status of compliance and CSR promotion company-wide, as well as on the status of the implementation of compliance and CSR promotion education for the past year, etc., and participants deliberate on a promotion plan for the current fiscal year.

Promotion members convene departmental meetings once a quarter, with educational training aiming at the permeation of compliance and CSR in each department. After departmental meetings, promotion members implement compliance and CSR promotion education in their respective departments using training materials or in-house educational materials and report the result to the Secretariat.

We are also pursuing awareness-raising and educational activities targeting Group companies through our Takuma Group Coordinating Committee for Compliance & CSR Promotion to ensure thorough compliance and risk management throughout the Group.



Compliance & CSR promotion structure

Corporate Governance

✚ Risk Management Structure

Takuma follows a “Risk Management Policy” that connects company-wide risks and separately classifies them into “project risks” related to our core business, i.e., plant construction; “DBO project risks” and “DBO project operation, maintenance and management risks” related to our DBO business; and “potential risks,” “actualized risks,” and “financial reporting risks” related to other corporate business activities.

We are also building a risk management organization and constructing a system of risk management and promoting the strengthening of management for group companies as well through our Takuma Group Coordinating Committee for Compliance and CSR Promotion.

Risk Management Policy

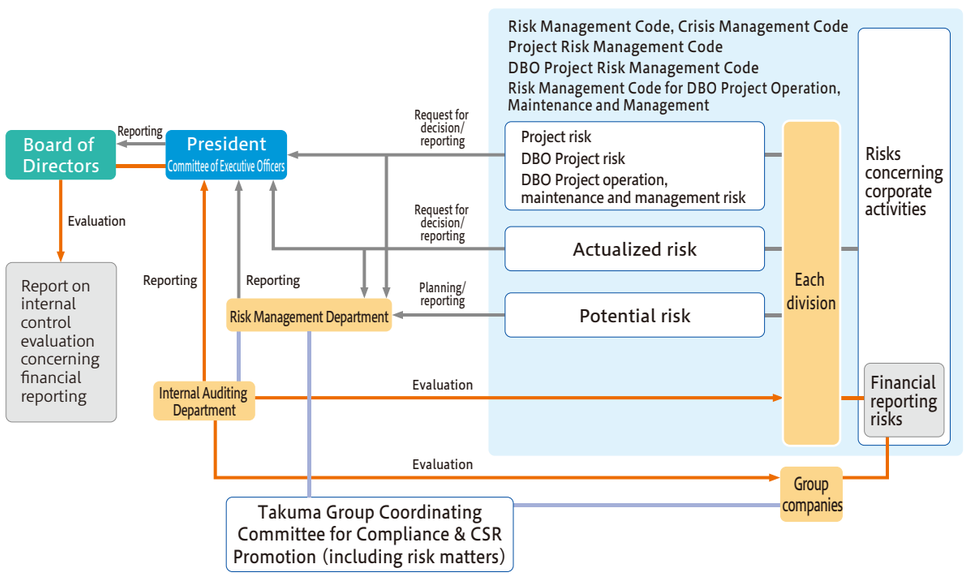
[Basic purpose of risk management]

Risk refers to all phenomena that interfere with the group’s ability to achieve its business objectives or cause losses or harm to the interests of stakeholders.

The Takuma Group practices risk management with the goal of increasing its corporate value by working to maximize returns while minimizing the negative impacts of risk.

[Risk management action guidelines]

1. The president and CEO is responsible for risk management at Takuma.
2. All officers and employees participate in risk management activities.
3. Risk management activities are carried out in accordance with applicable guidelines such as the Risk Management Rules.
4. Risk management activities are carried out in line with the Medium-Term Management Plan and annual plan, and we work to make improvements on an ongoing basis.
5. When risk manifests itself, we respond by taking responsible action quickly to minimize any damage and creating provisional organizational entities as necessary.
6. Group companies carry out risk management activities in accordance with their own policies and plans, with support from Takuma.



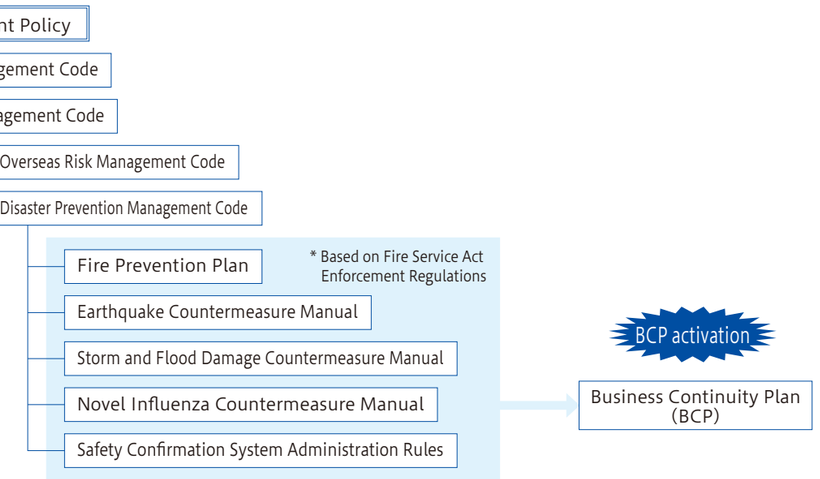
Risk management structure

✚ Business Continuity Plan（BCP）

Takuma has formulated a “Business Continuity Plan” based on the following policies to ensure proper and appropriate continuity of business operations in the event of a large-scale disaster, pandemic, or other emergency:

1. In addition to implementing disaster-related measures to secure the safety of corporate officers and employees, maintain structures so as to enable continuity of business operations while minimizing damage in an emergency.
2. Strive to respond to customer needs and recover from damage quickly by working closely with suppliers and partner companies to continue business operations.
3. Earn the trust of numerous stakeholders, including employees, their families, shareholders, and nearby residents, and fulfill social needs by continuing business operations.

【Disaster rule system diagram】

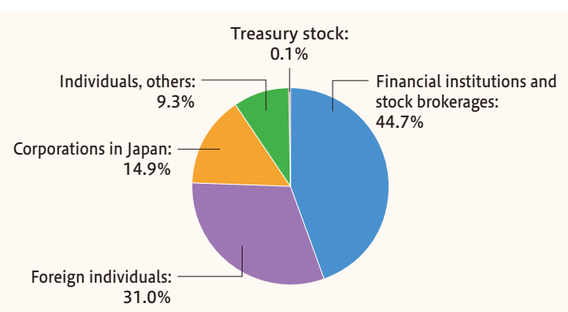


✚ IR Activities

In keeping with the “Takuma Group Code of Conduct,” we provide our shareholders and investors with accurate corporate information in a timely and fair manner. As a part of this, we provide notifications on the convening of General Meetings of Shareholders, balance sheet information, timely disclosure information, marketable securities reports, annual reports in English and other business information, all on our website.

[Takuma website > IR information]
http://www.takuma.co.jp/english/investor/index.html

Shareholders Report



Composition of shareholders (as of March 31, 2018)

Corporate Governance

+ Directors and Executive Officers

(as of June 27, 2018)

Directors

(Back row, from the left)

Minoru Murata
Outside Director
(Audit & Supervisory Committee Member)

Hiromichi Satake
Outside Director
(Audit & Supervisory Committee Member)

Koji Tanaka
Director
Executive Officer

Osamu Iwahashi
Outside Director
(Audit & Supervisory Committee Member)

Yasushi Enomoto
Director
(Audit & Supervisory Committee Member)

(Front row, from the left)

Tsuyohito Nishiyama
Director
Managing Executive Officer

Kengo Numata
Director
Executive Vice President

Takaaki Kato
Representative Director
President and
Chief Executive Officer

Hiroaki Nanjo
Director
Senior Managing Executive Officer

Hideki Takeguchi
Director
Managing Executive Officer

Executive Officers

Respect for Human Rights and the Abolition of Discrimination

Our company sets out its respect for basic human rights and prohibition of discriminatory acts in the Takuma Group Ethics Charter, Takuma Group Code of Conduct and labor regulations. In addition, we also support respect for human rights, without contributing to human rights violations, elimination of forced labor/child labor and the abolition of discrimination through participation in the UN Global Compact. We are also working to promote employment of disabled and elderly individuals.

- **Takuma Group Ethics Charter (excerpt)**

4. We shall respect fundamental human rights and never practice discrimination.

- **Takuma Group Code of Conduct (excerpt)**

【Respect for basic human rights】

9. Prohibition of discriminatory actions
10. Respect of individuality, personal quality and privacy
11. Safe work environment

+ Lecture on harassment

In January 2018, we invited attorney Yukiko Higashioka of Koyano LPC to deliver a talk on harassment entitled “Compliance and Harassment.”

She explained laws related primarily to sexual harassment and power harassment in specific terms and included information about Takuma’s regulations and systems, providing an opportunity for employees to learn about preventing harassment and how the company responds to such allegations.

Working with Our Employees

Takuma is implementing a variety of measures to enable each and every employee to make the most of his or her abilities and to approach his or her job with motivation and interest.

+ Systems designed to boost employee motivation

1. Objective management and human resources evaluation system

At the beginning of each fiscal year, employees meet with their supervisor to determine their objectives for the year based on their department’s policies. They also participate in a midyear interview with their supervisor in September and in an interview the following March to reflect on the year, with the supervisor offering feedback by evaluating their job performance. In this way, supervisors work to train and motivate their subordinates through two-way communication.

Organizational objectives ▶ Establishment of individual objectives ▶ Implementation of objectives ▶ Midyear interview ▶ Implementation of objectives ▶ Evaluation ▶ Feedback interview

2. Self-reporting system

We have introduced a self-reporting system that allows employees who have worked for the company for at least three years to communicate their thoughts on their future career path directly to the company every three years. Through this system we are working to assess employees’ awareness, needs, and issues and to apply that information to human resources measures.

3. Work group transfer system

We have created a work group transfer system to facilitate movement from clerical and labor positions to the main career track so that motivated and skilled employees can make use of their abilities regardless of their gender or academic background. We also provide opportunities for employees to be promoted to management positions.

4. In-house commendation system

Each year on June 10, the anniversary of the company’s founding, we recognize employees who have helped improve the company’s performance; done something exceptional outside the company; earned qualification as a professional engineer, doctoral degree, patent, or other accomplishment; worked for the company continuously for a certain number of years; authored an exceptional paper; supervised an accident-free site; or otherwise earned recognition.

+ Programs to boost employee skills

1. Grade-specific educational programs

We work to boost employee skills through grade-specific educational programs that mark career milestones, starting with new-employee training and moving on to a technical presentation at the two-year mark, a thesis discussion at the five-year mark, a presentation at the 10-year mark, and mid-career training. We also work to improve management skills by offering training to management candidates.

New-employee training ▶ Technical presentation by 2-year employees ▶ Thesis discussion by 5-year employees ▶ Presentation by 10-year employees ▶ Mid-career training ▶ Management training

2. Technical training sessions

We hold technical training sessions in order to increase employees’ technical knowledge, including lectures by university professors and outside researchers and presentations by Takuma engineering employees about their work responsibilities and research themes.

3. Skill improvement support structures

We work to improve employees’ skills by helping them earn public qualifications, for example by reimbursing them for the cost of license and qualification examinations and by offering incentives to employees to earn such qualifications.

We offer a course to help employees prepare to earn certification as professional engineers, with employees who have already earned those qualifications offering guidance on solving examination questions and conducting simulated oral examinations.

+ Workstyle reform initiatives

1. Initiatives to correct excessive working hours

In addition to having the Human Resources Department interview employees with excessive working hours and their supervisors to assess the causes of the phenomenon, we are pursuing initiatives to study and implement corrective measures and to verify their effectiveness.

2. Initiatives to encourage employees to utilize annual leave and other programs

During the second half of FY2016, we began implementing a measure to have employees systematically utilize five days of the time off they’re allowed under annual paid leave and other programs.

+ Employee health initiatives

In addition to stress checks and examinations to assess the risk of adult-onset diseases, our annual health checkups include cancer and gastric checks for employees who wish to have them.

We also hold health consultations by an occupational physician (once a month) and counseling sessions by a clinical psychologist (twice a month) as part of our commitment to facilitating employees’ physical and emotional health.

Working with Our Employees

+ Initiatives to promote the participation of female employees in the workplace

We have formulated and made available a general employer action plan in accordance with the Act on Promotion of Women's Participation and Advancement in the Workplace, and we have worked to deepen understanding of the company on the part of women by including information about talks by female employees on our recruiting website and by holding information sessions for female college students. In addition, we are working to increase the number of female employees in management positions and the number of female employees on the main career track (including individuals who have been tentatively offered positions) as of March 31, 2021, to 20, which would be double the corresponding number as of March 31, 2016, by putting in place a workplace environment that allows flexible workstyles and continued employment by women, for example by expanding eligibility for our flex time system.

A talk by a female employee (top) and an information session (bottom)

+ Promoting employment of senior citizens

We have put in place programs to offer employees who have left the company after reaching 65 years of age reemployment at Takuma and Group companies.

● Number of reemployed individuals over the past 5 years

	FY2013	FY2014	FY2015	FY2016	FY2017
Number of employees reaching retirement age	8	12	11	3	5
Number of employees desiring reemployment	6	10	10	2	5
Number of reemployed employees	6	10	10	2	5

+ Child-raising and nursing care support measures

We offer the following work programs as support measures for employees with child-raising and nursing care responsibilities.

1. Reduced working hours and flex time program

We offer reduced working hours to employees who are raising one or more children age two or younger as well as a flex time program for employees who are raising one or more children from age three through lower elementary school (through third grade). We also allow employees who are responsible for providing nursing care to a family member to utilize these programs.

2. Telework program

Since April 2015, we have allowed employees who are raising one or more children who have not yet begun attending elementary school or who are responsible for providing nursing care to a family member to work from home one day a week.

● Impressions from an employee who has taken advantage of these programs

I have two infant children, and in our family, the hour between the time the kids wake up in the morning and the time they leave the house, and the hour from the time we pick them up in the evening until we have dinner are extremely difficult, both physically and emotionally. By working from home, I've been able to allocate time that I would otherwise spend commuting to childcare and household chores during those times, and that's been extremely helpful by letting me reduce my wife's workload.

+ Social welfare programs that meet employee needs

We have introduced cafeteria-style social welfare programs as one way to meet a diverse range of employee needs. This approach provides a fixed annual allowance that employees can "spend" as they wish by choosing from a menu of benefits that includes support for self-study, child-raising and nursing care, healthy living, and financial well-being.

Efforts for Occupational Safety and Health

+ Occupational safety and health initiatives

Since FY2006, we have introduced TK-COHSMS based on an occupational safety and health management system for the construction industry and worked actively and independently to improve our safety and health activities. We believe that among these efforts, the manner in which (1) safety inspections, (2) mandatory safety and health education (education for construction site representatives), and (3) creation of pre-work safety procedure checklists known as SSAs have been steadily adopted by all departments and used to consistently improve the level of knowledge about Takuma's safety and health is particularly noteworthy.

We have adopted the following safety and health objectives for FY2018: for construction sites, eliminating accidents that result in work stoppages (of four or more days); for branches, pursuing a thorough program of safety and health education, ensuring adherence to safety inspection guidelines, and implementing the branch safety patrol plan; and for the Safety and Health Cooperative Association, strengthening collaboration with partner companies. We will work to revitalize safety and health activities throughout the company by carrying out that role.

Rather than contenting ourselves with the status quo, we will pursue new safety and health initiatives to foster a deep awareness of the concept that underlies our safety and health policy—"understanding the need for respecting people and giving top priority to safety and health"—on the part of everyone who's involved in our operations.

+ Safety and health activities and their results

1. Safety inspection system

We maintain a system where any construction or installation work starts only after the safety and health manager or other responsible official in each department conducts a successful safety inspection based on safety and health plans for the construction or installation work as prepared by our primary partner companies.

We strive to ensure a safe work environment at all construction sites by eliminating potential hazards and risk factors identified by those inspections before work begins.

A safety inspection meeting

● FY2017

Number of safety inspections done: 160
(Initial inspection pass rate: 94%)

2. Safety patrols and field education

Based on an annual plan, safety patrols are carried out at worksites by the Safety and Health Committee (comprised of committee members and advisors), Safety Control Department, and construction division along with safety education in the field in a precisely targeted and efficient manner.

By focusing on the early discovery and elimination of risk in safety patrols and on the improvement of safety awareness among workers through communication skills in field education, these activities help ensure the safety of Takuma's workplaces.

● Number of safety patrols implemented in FY2017

By Safety and Health Committee (members, advisors): 28
By Safety Control Department: 297
By construction division: 305

Field education

Safety patrols

Efforts for Occupational Safety and Health

3. Safety and health education (education for construction site representatives)

We continuously provide specialized safety and health education at branches and worksites to increase the levels of safety awareness and knowledge of our employees and partner companies.

As indicated below, more than 16,000 trainees have passed the completion exam. We are involved in a variety of initiatives to put in place mechanisms for preventing accidents, including by assigning workers with extensive knowledge in areas such as safety-related laws and ordinances to individual construction sites.

- **April, 2004 to March, 2018**

Cumulative number of trainees:	33,362
Number of trainees passing the completion exam:	16,050

Head Office venue

Tokyo Branch venue

+ Safety and Health Meeting

Takuma holds a Safety and Health Meeting to bring workers with safety- and health-related responsibilities together to improve and share their safety and health awareness with the goal of ensuring worker safety and health and promoting the development of a pleasant work environment.

The FY2017 meeting included awards for partners who helped achieve zero-accident records at worksites and employees who achieved zero-accident performance over many years as worksite managers along with a lecture entitled "Proper Use of Work Safety Equipment" and a talk by an outside instructor entitled "Preventing Human Error: Preventing Errors through Teamwork." In addition, safety and health partner companies gave presentations on their safety and health policies and goals, and all participants closed the meeting by chanting the FY2017 slogan and pledging to continue to work toward thorough safety and health management by utilizing TK-COHSMS.

Presentation of a zero-accident record award

Pointing and chanting of the slogan by all participants

+ Message from a partner company

Toshiya Sakaguchi
President
Chokyu Chikuro Industries Co., Ltd.

Our company, which recently celebrated the 47th anniversary of its founding, focuses primarily on repairing waste incineration facilities in western Japan. Our previous president did business for many years with Takuma, and I've learned much about a variety of topics from Takuma since I first joined the company, including furnace installation technology and safety and health management.

Safety and health management activities are the responsibility of each company, and we carry out branch safety patrols on worksites to check every aspect of the work going on there. In addition, I believe it is our mission to keep tabs on each worker's state of health and to confirm that all rules are being followed and that SSA and KYK (hazard prediction activities) are being carried out using the "genba, genbutsu, genjitsu" philosophy.

A major challenge for us going forward will be Japan's labor shortage, and we're particularly focused on training young furnace installation technicians. With regard to strengthening supervisor skills, we plan to do our best, both by offering in-house training and by participating in site agent training offered by Takuma.

In closing, we will continue to strive in partnership with Takuma to create workplaces where employees can work safely and with peace of mind and to complete installation work with zero accidents by following the slogans of "avoiding injury" and "absolutely avoiding causing injury."

+ Message from Takuma's person in charge of procurement

Shinobu Arakawa
Manager
Section 4,
Construction Department (Osaka)

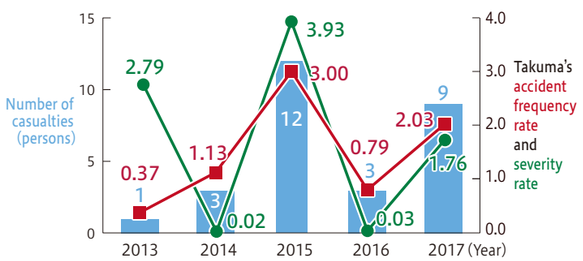
We're extremely grateful to Chokyu Chikuro Industries Co., Ltd., which has worked with Takuma as a partner company for close to half a century, primarily by repairing furnaces at waste incineration facilities.

You've worked steadily to ensure the safety and health activities that Takuma carries out at its worksites have taken root among your employees, and the results of this steady effort to raise safety awareness on the part of all workers in the field has helped you continue to operate without any accidents that resulted in a work stoppage for about 20 years. As a result of this track record, you've made a significant contribution to our efforts to build safe workplaces.

Although there are many causes for concern as you continue to operate your business, including the labor shortage in the construction industry, I hope that your company will continue to grow while thoroughly practicing and enhancing risk management to address changing conditions.

+ Takuma's safety results in recent years

During 2017, both the construction industry and Takuma benefited from brisk business conditions. Although the total number of occupational accidents, including accidents that did not result in work stoppages, fell compared to 2016, the number of accidents that impacted our safety record by necessitating work stoppages rose. In addition to enhancing our safety and health management structures in order to halt this trend, we will work to ensure even more thorough risk management through a unified effort by all involved so that we can redouble our resolve to eliminate occupational accidents.



Takuma's safety results

Year	Accident frequency rate	Accident severity rate
2013	1.25	0.23
2014	0.91	0.07
2015	0.92	0.21
2016	0.64	0.11
2017	0.81	0.18

* Accident frequency rate
Indicates the frequency with which accidents occur as the number of fatalities caused by occupational accidents per 1 million actual working hours.

$$\frac{\text{Number of fatalities}}{\text{Total actual working hours}} \times 1{,}000{,}000$$

* Accident severity rate
Indicates the seriousness of accidents as the number of work-days lost per 1,000 actual working hours.

$$\frac{\text{Total work-days lost}}{\text{Total actual working hours}} \times 1{,}000$$

Reference: Nationwide accident frequency and severity rates for the construction industry (general construction)

The Environment

+ Basic Environmental Policy

Our company has established the “Basic Environmental Policy” as follows, aiming to ensure employees contribute to global environmental conservation. This basic policy applies to the activities of all company departments.

Environmental Philosophy

Takuma is committed to preserving the environment and realizing an affluent society through business activities under the Company Motto: “Value Technology, Value People, Value the Earth.”

Operational Guidelines

1. All Takuma Group companies will recognize the importance of maintaining a balance between preservation of the environment and business activities.
2. Continuously develop activities to preserve the environment that comply with applicable environmental laws and ordinances, and ensure environmental control and assessment systems conform to international environmental standards.
3. Promote development of improved technologies and products for society that preserve the environment.
4. Address resource conservation, energy efficiency, recycling, and minimization of waste generated by all business activities.
5. Improve employee awareness and understanding about the importance of preserving the environment through environmental education and internal promotional activities.
6. Provide the community with information on the activities of Takuma to preserve the environment.

+ Environmental Management

● The situation concerning the acquisition of ISO 14001

Our Harima Factory has acquired ISO 14001 certification and has been implementing environmental management activities based on an environmental management system established to comply with international standards.

Our group companies Nippon Thermoener Co., Ltd., Takuma Technos Co., Ltd., and Dan-Takuma Technologies Inc. have also acquired ISO 14001 certification.

+ Takuma’s CO_2 Reduction Technologies

We convert waste/biomass into energy and reduce CO_2!

In 1 year, Takuma products cut about 5million tons!

(Equivalent to the CO_2 absorbed by about 350 million Japanese cedar trees*)

*Assuming one Japanese cedar tree absorbs 14 kg of CO_2 per year.

Reducing CO_2 with biomass power generation boilers

A classic example of biomass power generation can be found in sugar factories. Factories that make sugar produce large quantities of residue from sugarcane, the raw material used to make sugar. Sugarcane is crushed into a pulp, and sugar is extracted in a mill. The remaining fiber is called bagasse and can be used as boiler fuel. The steam produced is used as the plant’s heat source, and any remaining steam is used to generate electricity that is utilized to operate the plant and, if any remains, sold to the electric power company. The amount of power generated at sugar factories has grown greatly, with examples of single plant that generates 50,000 kW.

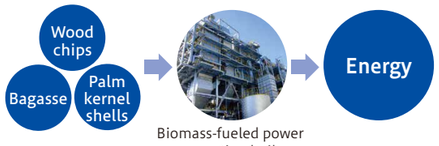
In 1 year, down about 4million tons!

CO_2 reduction achieved by Takuma’s biomass power generation boilers

(as of end of FY2017)

● What is biomass?

Biomass is any recyclable organic material derived from a living organism, but does not include fossil fuels, such as oil and coal. For example, even though CO_2 is emitted if wood waste products are incinerated, when trees grow again, they absorb CO_2 to offset the emissions from incineration, so there is no increase in CO_2 in the atmosphere. By using the heat produced by incinerating biomass to generate power, the amount of power generated using fossil fuels can be reduced, and this contributes to decreasing CO_2.



Biomass-fueled power generation boiler

CO_2 reduction from waste incineration plants

Garbage, or waste, is an important source of energy. About 500 kW** of power can be generated from one ton of garbage. In Europe and the Americas, waste incineration plants are often called Energy from Waste (EfW) plants, and recovering energy from garbage has become the norm. Waste must be seen as a “resource,” so Takuma is seeking to be the best in the world with our technologies to convert waste into energy and reduce CO_2.

** Presumes waste with a calorific value of 8,800 kJ per kg and a power generation efficiency of 20%

1 ton of garbage → Waste combustion → About 500 kW of power generated

In 1 year, down about 1million tons!

CO_2 reduction achieved by Takuma’s municipal solid waste incineration plants and industrial waste incineration plants

(as of end of FY2017)

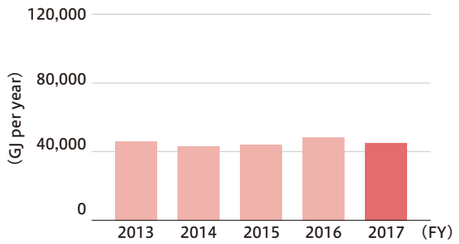
The Environment

✚ Environmental Reporting

Takuma reports the environmental impact of its business activities as well as the manner in which it takes environmental considerations into account in accordance with the Environmental Reporting Guidelines (issued by the Ministry of the Environment). This environmental reporting program includes not only environmental information extracted from our overall business activities from an environmental standpoint, but also information about related economic and social aspects of those activities.

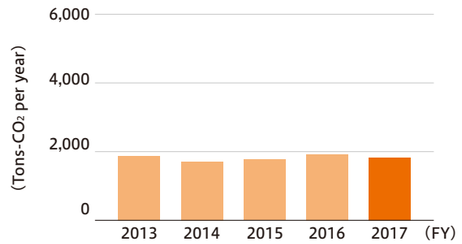
Environmental data (non-consolidated)

● Total energy consumption



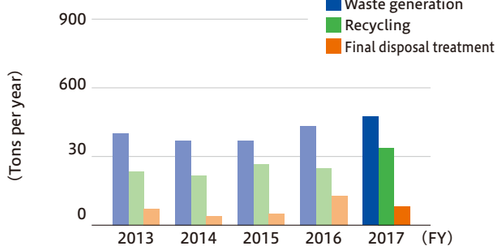
The total energy consumption of the fuel and the electricity consumed at Takuma during FY2017 fell slightly compared to FY2016 levels. We will continue to promote energy savings from here on out.

● Greenhouse gas emissions



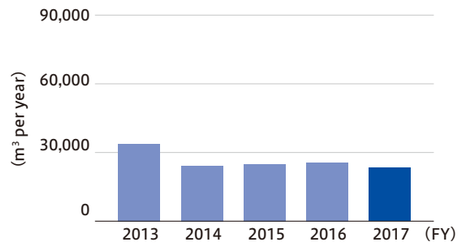
The greenhouse gas emissions created by our company are limited to carbon dioxide (CO_2). The amount of CO_2 emissions in FY2017 fell slightly compared to FY2016 levels. We will continue striving to reduce CO_2 emissions.

● Waste generation



Our company sells recyclables and reusables from the waste generated through its business activities to scrap dealers, while outsourcing the treatment of non-recyclables and non-reusables to haulers, processors and final disposal dealers, in accordance with the Industrial Waste Control Manifest system.

● Water usage



Takuma's water consumption during FY2017 fell slightly compared to FY2016 levels. Going forward, we will continue to work to lower our water use.

PRTR target substance emissions

Although our business activities do not involve a wide variety of chemical substances on a massive scale, we use a few designated chemical substances. Consequently, we report and register such chemical substances designated under the Pollutant Release and Transfer Register (PRTR), in accordance with relevant laws and ordinances, with the local government.

● Dichloromethane (CAS No. 75-09-2)

FY	2013	2014	2015	2016	2017
Emissions (tons per year)	0	0.3	0.4	0.4	0.5

● Xylene (CAS No. 1330-20-7)

FY	2013	2014	2015	2016	2017
Emissions (tons per year)	1.4	3.4	2.2	2.9	1.2

● Toluene (CAS No. 108-88-3)

FY	2013	2014	2015	2016	2017
Emissions (tons per year)	0.08	0.08	0.26	0.09	0.62

These materials are used for antirust painting of boiler structures and so on.

Environmental accounting

Environmental accounting is the process by which companies and other entities recognize the cost of environmental conservation in their business activities as well as the effects of those activities and measure and communicate them in as quantitative a manner as possible (either in terms of monetary amounts or amounts of materials) with the goal of pursuing environmental conservation initiatives in an efficient and effective manner while maintaining a good relationship with society so as to facilitate sustainable development.

In FY2006, we introduced and disclosed our own environmental accounting system based on the "Environmental Accounting Guidelines 2005" issued by the Ministry of the Environment. As our business activities mainly involve environmental conservation plants and their equipment, Takuma Group employees have a significant awareness of the need for environmental conservation, and we have been implementing approaches toward such issues within the Takuma Group.

● Environmental conservation cost

According to the "Environmental Accounting Guidelines," environmental conservation costs measure on a monetary basis investments and expenditures on preventing, controlling, or avoiding environmental impacts, eliminating their effects, recovering from associated damage, and initiatives to aid in the same.

Item	Investment (thousand JPY)	Costs (thousand JPY)
Business area costs		
Pollution prevention costs	21,851	17,197
Global environmental conservation costs	15,190	21,806
Resource recycling costs	—	12,971
Management activity costs	—	46,685
Research and development costs	4,028	1,361,328
Social activity costs	—	9,925
Total	41,069	1,469,912

● Environmental conservation effect

According to the "Environmental Accounting Guidelines," environmental conservation effects measure on a material basis the effects of preventing, controlling, or avoiding environmental impacts, eliminating their effects, recovering from associated damage, and initiatives to aid in the same.

Item	FY2016	FY2017
(1) Environmental conservation effect concerning resources input for business activities		
Total energy input (GJ)	101,681	97,416
Water resources input (m^3)	50,584	45,460
(2) Environmental conservation effect concerning environmental loads and wastes created by business activities		
Greenhouse gas emission volume (tons-CO_2)	4,337	4,131
Waste generation (tons)	976	1,028
Final disposal volume (tons)	163	131
Total drainage volume (m^3)	48,299	45,460
BOD emissions (kg)	2,720	2,448
COD emissions (kg)	2,898	2,613
T-N emissions (kg)	698	645
T-P emissions (kg)	119	111

Scope of data collected

- Period covered:
  April 1, 2017, to March 31, 2018
- Companies targeted:

[12 domestic companies]
- Takuma Co., Ltd. (Head Office, other offices including overseas sites and the Harima Factory)
- NIPPON THERMOENER CO., LTD.
- Takuma Technos Co., Ltd.
- Hokkaido Sanitary Maintenance Co., Ltd.
- Takuma Technos Hokkaido Co., Ltd.
- SUNPLANT Co., Ltd.
- Takuma Engineering Co., Ltd.
- Takuma System Control Co., Ltd.
- Dan-Takuma Technologies Inc.
- Kyoritsu Setsubi Co., Ltd.
- Kankyo Sol-Tech Co., Ltd.
- Takuma Plant Service Co., Ltd.

[2 overseas subsidiaries]
- Taiden Environtech Co., Ltd.
- Siam Takuma Co., Ltd.

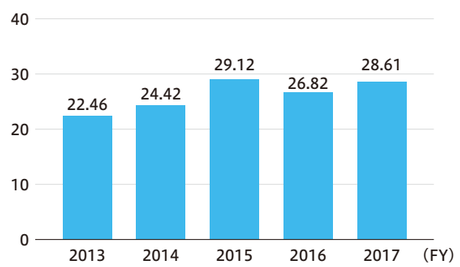
Environmental efficiency

Even as total environmental impacts must be reduced, it is necessary from a business management standpoint to pursue environmental initiatives that are characterized by a high degree of economic efficiency. We report environmental efficiency using an index calculated in accordance with examples provided by the Ministry of the Environment in its Environmental Performance Indicators Guidelines for Organizations.

At the Takuma Group, we calculate environmental efficiency as the ratio of consolidated net sales to greenhouse gas emissions. In FY2017, this value improved slightly compared to FY2016.

● The Takuma Group's definition of environmental efficiency

$$\frac{\text{Consolidated net sales (million JPY)}}{\text{Greenhouse gas emissions (tons-}CO_2\text{)}}$$



Environmental efficiency

Fair Business Practices

+ Compliance & CSR Promotion Education

Takuma offers compliance and CSR promotion education through the Compliance & CSR Promotion Organization (see page 46), which was established in order to spread awareness of compliance and CSR issues among employees.

During FY2017, we implemented education focusing on compliance and CSR promotion in four separate stages (see below) in keeping with our policy of pursuing a sustained and thorough program of improving compliance and CSR awareness and risk management based on a consideration of internal conditions and the characteristics of Group companies in response to social requirements and expectations in accordance with the basic policy of cultivating a robust corporate culture and the perspectives of accommodating environmental change and practicing risk management as set forth in the 11th Medium-Term Management Plan.

- 1st term: Bid-rigging and the Antimonopoly Act
- 2nd term: Takuma CSR comprehension test
- 3rd term: Risk management, security export control
- 4th term: Compliance and harassment, forward-looking CSR activities: CSR issues and an action program

CSR lectures for management-level employees

During FY2017, we invited experts to give the following talks to management-level employees:

1st lecture (September 27, 2017)
"Compliance as a way to increase corporate value: Taking advantage of internal reporting systems"
(Lecturer: Mr. Kiyoshi Endo, Attorney at Law, Endo Kiyoshi Law Office)

2nd lecture (January 24, 2018)
"Group management and the responsibilities of parent company officers"
(Lecturer: Ms. Junko Yamada, Professor, The Konan Law School)

+ Compliance Measures

● Initiatives to ensure compliance with the Antimonopoly Act

Towards ensuring permanent compliance with the Antimonopoly Act, Takuma enacted "Regulations Concerning Management of the Pledge of Antimonopoly Act Compliance," which provides for the submission of a written oath in regard to observing the Antimonopoly Act.

"Rules on Controlling Contact with Competitors' Sales Departments, Etc.," defines the procedure for an employee to contact the sales department, etc., of a competitor and specifies that an application should be made to and an approval should be obtained from the affiliated division or center manager in advance to ensure fair business contact.

● Holding training sessions about the Antimonopoly Act

We hold regular training sessions about the Antimonopoly Act to deepen participants' understanding of the act and to ascertain the latest information about it.

● Introducing a Legislation Information Service

In order to allow its employees to gain a continuous grasp of the latest changes to laws and ordinances, Takuma introduced a Legislation Information Service. In this system, legislation alerts highlighting revisions to, and abolition of, laws and ordinances are sent by e-mail in advance to employees, who can also review detailed information about the corresponding law or ordinance on the website as needed.

In addition to current laws and ordinances, the system lets users search for legal precedents and public comments to facilitate an even greater understanding of relevant laws and ordinances.

+ CSR Awareness Survey

As a means of understanding the level of awareness of compliance and CSR and the level of permeation of education that promotes these priorities, and employing that data as reference for the integrated activities carried out during each fiscal year and for the following fiscal year's action plan, we have conducted the "CSR Awareness Survey" every year since FY2008 with the end goal of utilizing that information for future compliance and CSR promotion activities. The survey has included Group companies since FY2013.

We actively use survey results in our activities, for example by offering additional education in areas that received lower scores than in the previous survey.

We will continue to offer this survey and use its results to improve compliance and CSR promotion education on an ongoing basis.

+ In-house Reporting System

Takuma has been operating an in-house reporting system since FY2006, with the aim of promoting compliance management by uncovering illegal or unfair acts as early as possible and undertaking corrective measures.

Reporting contacts are set up at our Compliance & CSR Promotion Division and at an outside law office, as well as a dedicated outside report contact for anonymous e-mail reporting. Our "In-house Reporting Code" and the Takuma Group Code of Conduct further declare that no informant shall be subjected to disadvantageous treatment simply due to his or her having filed a report.

Furthermore, in order for this system to be correctly understood and utilized, we distribute a card to all employees with information on the reporting contacts and regularly publicize the system.

In-house reporting process

+ Material Procurement Policy

Our Purchasing Department carries out procurement activity in accordance with its Material Procurement Policy.

We provide fair opportunities for all suppliers, irrespective of nationality, company size, or transaction history. Suppliers are selected based on our comprehensive evaluation of their reliability and safeness in terms of quality, price, delivery, etc., as well as their abilities in technological development and supply capabilities.

Long-term stable transactions with dependable suppliers result in improved product reliability and greater corporate value. We, therefore, seek to establish relationships of mutual trust and mutual development with our suppliers.

While also respecting relevant laws and regulations as well as social norms, we strictly control and maintain any confidential information that we obtain through our business transactions.

【Material Procurement Policy】

1. Treat all candidates fairly when selecting a supplier.
2. Strive to discover new manufacturers.
3. Strictly control confidential information.
4. Strive to acquire new and pertinent information.
5. Promote green procurement.
6. Comply with laws and ordinances related to business dealings.
7. Always keep VA and VE in mind.
8. Strive for self-development.

More information about the procurement procedures used by our Purchasing Department is available on the following website:
[Takuma website > Material Procurement] http://www.takuma.co.jp/procurement/ (content in Japanese)

Activities Involving Product Quality

The amount of attention paid by consumers (stakeholders) to quality in a wide range of fields, including manufacturing and services, has been growing in recent years. This section introduces Takuma initiatives that are designed to provide safe, confidence-inspiring products and plants.

Takuma has earned certification under the ISO 9001 standard on management systems, and in December 2017 we completed our transition to the latest version of the standard, the 2015 edition. In addition to working to improve the quality of our products in accordance with our Quality Policy and quality management system, we are pursuing activities that emphasize customer satisfaction.

In order to produce products and plants that customers truly appreciate, it is necessary not only to boost the quality of the product itself, but also to improve the operations and quality as well as each individual's ability to create a good plant in each process from planning up to delivery (sales, planning, design, procurement, manufacture, construction, and management).

Takuma Co., Ltd. has adopted the following Quality Policy in order to provide satisfying products that meet customer expectations and earn a high level of trust while continuously improving the effectiveness of its quality management system.

Quality Policy
"Manufacturing products that result in customer satisfaction"

Based on that Quality Policy and the three priority items described below, Takuma is working to improve the quality of its products and services through a variety of initiatives that address every process, including in sales, planning, design, procurement, manufacture, construction, and management.

+ Priority items

- **Creating value to earn customer satisfaction (ascertaining customer needs and making improvements based on past experience)**
- **Carrying out risk management (addressing changes in the business environment and human error)**
- **Implementing human resources management (implementing human resources development and ensuring skills are passed down to younger employees)**

+ Specific initiatives for improving quality

Improving organizational operations

As an organizational initiative that's designed to boost product quality, we have each department establish quality targets at the beginning of the year and then provide regular reports (twice a year) on progress towards achieving those goals at QM Committee meetings (quality management reviews).

Internal quality audits

In addition to increasing the precision of operations by standardizing operating procedures in each department's processes, we are improving operations as necessary by carrying out an internal quality audit of each department to verify the status of quality management system operation.

Internal quality audits are carried out regularly by employees who have been certified as internal auditors after completing internal quality auditor training seminars offered by instructors from an outside organization. At the training seminars, employees master content ranging from basic knowledge about ISO 9001 to specific methods for conducting internal audits.

Improving the employees' individual operational skills

To improve employees' individual operational skills, we have created an operational skill achievement checklist that identifies the skills required by personnel in each process for use in regular assessments, and we are reviewing the targets we have chosen.

Quality control and process reviews

Quality control is an important measure that allows us to provide exceptional products and plants.

We take action (improvement measures) as outlined by a manual (standard) in the event a non-conforming product is discovered, but even if an issue doesn't lead to a non-conforming product, we conduct a review as a preventive measure if there are processes that could have caused the issue.

Furthermore, we actively offer training to new business partners and retraining (instruction) for existing business partners to prevent defects in the products we purchase.

+ Customer satisfaction survey

We carry out the following quality improvement initiatives:

(1) Conducting a customer satisfaction survey every year since FY2007

(2) Applying customer feedback with regard to delivered products and Takuma employees to quality and service

The figure to the right illustrates how the survey is administered.

First, we administer questionnaires targeting customers who had construction work done by asking them to assess the overall experience after the work is completed, including the nature of the work performed, suitability of delivered equipment, and the level of service provided by Takuma staff.

Next, the QM Committee calculates a score for each item based on the survey results as well as a report and explanation from the responsible department. The committee then analyzes the resulting data.

If we find a problem, for example an item receiving an evaluation score of less than 70 out of 100 or a score of 1 (dissatisfied) or 2 (rather dissatisfied) on a 4-point scale, the QM Committee analyzes the cause of the problem and studies measures to prevent recurrence based on interviews with the department in question. We also evaluate aspects of our products and services that receive especially high praise from customers and work to further enhance customer satisfaction by combining problem areas and praiseworthy areas and applying them horizontally across involved departments at the company.

Customer satisfaction survey process

Decide where to conduct the questionnaire survey

↓

Conduct the questionnaire survey

↓

Investigate the questionnaire results

Analyze problem factors and investigate recurrence prevention countermeasures
(if results are lower than our standard)

Analyze praiseworthy factors
(particularly for praiseworthy aspects)

↓

Apply recurrence prevention measures and praiseworthy factors across the organization

↓

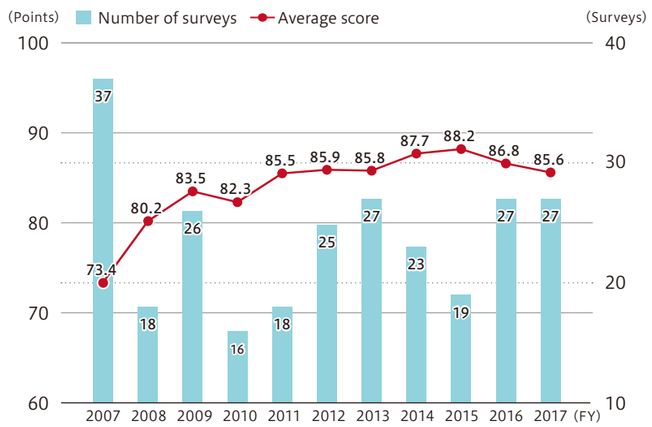
Follow up with recurrence prevention measures

Follow up on results

For customers targeted for problem analysis and consideration of preventive measures based on the survey results, we also conduct a follow-up survey to discern whether those measures were reliably implemented and whether their level of satisfaction has indeed improved.

With scores averaging higher than 80 points every year since its second year, the questionnaire demonstrates the effectiveness of our initiatives.

In this way, we work to improve product and plant quality so that all customers are satisfied.



Number of questionnaire surveys and average score

Participation in the Community

Reflecting their dedication to providing safe, reliable facilities that inspire peace of mind on the part of local residents, Takuma and its Group companies work actively to disclose information in an appropriate manner, keep the areas around plants clean, participate in regional activities, and engage in exchanges with local residents. This section introduces some of those efforts.

Hitachinaka-Tokai High Trust Co., Ltd.

Hitachinaka-Tokai High Trust is working actively to participate in local activities and to foster exchanges with local residents, including by participating in coordinated clean-up activities in the surrounding area.

During FY2017, the company sponsored and participated in the 66th Katsuta Marathon, which was held in January 2018. The company has been involved with the event every year since it was first run.

Kurume High Trust Co., Ltd.

Kurume High Trust offers nature and environmental learning programs to ensure that Kurume's pleasant living environment can be passed on to the next generation, primarily through the Miyanojin "Manabino" Biotope at its facility, which is designed to serve as a space where visitors can learn about wildlife in the Kurume region.

During FY2017, the company offered three classes for area parents and their children: a firefly-watching class entitled "Let's Go View Fireflies" in June, "The Great Search for River Life" in August, and "The Great Search for Biotope Life" in November.

Suwako High Trust Co., Ltd.

In FY2017, Suwako High Trust welcomed more than 300 visitors to its facility in November when it hosted the "Eco-Poppo Community Festival," which is named for the site. Following a report on the operation of the plant, Okaya City Nagaike Elementary School's chorus performed. In addition, "Explore eco-Poppo" tours offered attendees a chance to tour parts of the facility that are normally off-limits to visitors, and there was also a simulation designed to let people see what it's like to operate a waste crane.

Hokutan High Trust Co., Ltd.

Hokutan High Trust provides space to foster exchanges with area residents to facilitate environmental learning and awareness-raising, including by preparing to serve as an evacuation site in the event of a natural disaster.

During FY2017, the company participated in the Clean Park Hokutan Festival, which was held in order to deepen the general public's understanding of the facility through events such as facility tours, nature experiences as part of an environmental learning program, and craft lessons. Many visitors brought their children and participated in the craft lessons, where they made items such as candles, bamboo crafts, and plastic bottle airplanes.

Iwate-Kenpoku Clean Co., Ltd.

Iwate-Kenpoku Clean is committed to disclosing information about its operations to the general public, including by publishing maintenance and management records on its website and by regularly publishing a variety of information in the IKC Newsletter.

During FY2017, the company continued to be involved in community service activities, including by participating in the village of Kunohe's Village Sports and Recreation Festival in September and by picking up litter in the Esashika district and participating in the Kunohe Industry, Art, and Culture Festival in October.

Contribution to Society

This page introduces some examples of Takuma's community service activities.

●Takuma Group coordinated cleanup activities

The Takuma Group orchestrates coordinated clean-up activities in the areas around its worksites each year as a way for volunteers to beautify the environment and contribute to society. During FY2017, a total of 547 employees participated in two such activities. The activities provided an opportunity for employees to think afresh about waste-related issues and their connection to the community. Going forward, the Takuma Group will continue this initiative.

●Participation in the "Osaka Marathon 'Cleanup' Campaign"

In November 2017, volunteers from the former Plant Service Department (Osaka) participated in the "Osaka Marathon 'Cleanup' Campaign," a cleanup activity that is held every year as part of the Osaka Marathon. The activity brought together organizational, group, and individual volunteers to beautify public spaces throughout the city.

●Blood donation campaign

Takuma supports blood donation activities through the Japanese Red Cross Society. During FY2017, a total of 167 donors participated in spring and fall blood drives at the Head Office and Harima Plant. Donors can simultaneously register as bone marrow donors, and this year four employees did so. We plan to continue this activity in the future.

Blood donation activities

WFP fundraising activities

●WFP fundraising activities

Takuma serves on the Board of Trustees of the Japan Association for the World Food Programme, the official supporting partner of the World Food Programme in Japan. Each year, we display WFP posters at the entrances to company buildings and in cafeterias during a campaign that lasts from June through August. The campaign serves both to increase employee interest in the world's food problems and to collect donations to address them.

Contributions to NPOs

●Purchasing UNICEF Christmas cards

Takuma purchases UNICEF Christmas cards. A portion of the proceeds is used to fund UNICEF in their work to help children around the world.

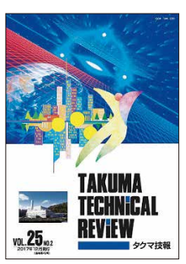
●Donating calendars to a charity calendar market

Takuma donates unused calendars to a calendar market sponsored by the NPO "Nippon Volunteer Network Active in Disasters." In FY2017, we donated about 100 calendars. The proceeds are used to provide aid for victims of natural disasters and other crises.

Publications

●Publication of the Takuma Technical Review

We publish the Takuma Technical Review twice a year to introduce technologies that Takuma has developed. Contents in FY2017 included an explanation of how sewage sludge incineration ash can be used effectively and reports on plant equipment operation, trial demonstration results, and observations from a visit to an environmental facility overseas. Abstracts are available on Takuma's website.
[Takuma top page > Technical Information > Technical Review]
http://www.takuma.co.jp/english/gijutu/gihou.html



Financial Data

✚ Trend in Principal Management Indicators and Other Financial Data

Fiscal year	109th (Millions of yen)	110th (Millions of yen)	111th (Millions of yen)	112th (Millions of yen)	113th (Millions of yen)	114th (Millions of yen)	114th (Thousands of U.S. dollars)
End of fiscal year	March 2013	March 2014	March 2015	March 2016	March 2017	March 2018	March 2018
Net sales	¥ 96,384	¥ 96,334	¥ 103,875	¥ 113,088	¥ 116,309	¥ 118,199	$ 1,112,562
Operating income	¥ 6,241	¥ 8,424	¥ 8,223	¥ 9,189	¥ 10,974	¥ 10,030	$ 94,408
Ordinary profit	¥ 7,168	¥ 9,449	¥ 9,116	¥ 9,646	¥ 11,606	¥ 10,670	$ 100,433
Profit attributable to owners of parent	¥ 6,145	¥ 8,835	¥ 8,030	¥ 7,817	¥ 8,551	¥ 7,847	$ 73,865
Comprehensive income	¥ 6,712	¥ 9,935	¥ 9,398	¥ 7,149	¥ 9,937	¥ 10,177	$ 95,797
Net assets	¥ 34,653	¥ 43,889	¥ 52,516	¥ 58,809	¥ 67,727	¥ 76,726	$ 722,193
Total assets	¥ 106,754	¥ 108,520	¥ 123,127	¥ 132,614	¥ 140,201	¥ 151,862	$ 1,429,420
Net assets per share (JPY or USD)	¥ 415.92	¥ 527.50	¥ 631.53	¥ 708.18	¥ 815.77	¥ 924.25	$ 8.70
Net income per share (JPY or USD)	¥ 74.32	¥ 106.86	¥ 97.12	¥ 94.55	¥ 103.43	¥ 94.93	$ 0.89
Diluted net income per share (JPY or USD)	-	-	-	-	-	-	-
Capital adequacy ratio (%)	32.2	40.2	42.4	44.1	48.1	50.3	50.3
Return on equity (%)	19.7	22.7	16.8	14.1	13.6	10.9	10.9
Price-to-earnings ratio	7.4	6.9	9.7	10.7	10.5	12.3	12.3
Cash flows from operating activities	¥ 17,465	¥ 8,270	¥ 21,727	¥ 6,728	¥ 9,590	¥ 5,141	$ 48,388
Cash flows from investing activities	¥ (59)	¥ (1,430)	¥ (160)	¥ (445)	¥ 143	¥ (328)	$ (3,088)
Cash flows from financing activities	¥ (8,887)	¥ (5,867)	¥ (3,707)	¥ (2,900)	¥ (1,787)	¥ (1,670)	$ (15,720)
End-of-year balance of cash and cash equivalents	¥ 26,005	¥ 27,030	¥ 45,008	¥ 48,335	¥ 57,132	¥ 60,283	$ 567,425
Number of employees	3,288	3,315	3,266	3,366	3,447	3,609	3,609

Note:
1. U.S. dollar amounts are shown solely for the convenience of readers and are translated at the rate of ¥106.24 to U.S.$1.00, the exchange rate prevailing at March 31, 2018.
2. Ordinary profit is a measure of accounting profit that equals operating income plus other income minus other expenses, except for extraordinary items under Japanese GAAP.

✚ Business performance during the fiscal year under review

The Japanese economy continued a gradual recovery during the consolidated fiscal year under review as corporate earnings grew along with employment and incomes. Despite gradual economic expansion overseas, uncertainty remained in the form of the UK's exit from the EU and actions by the administration in the U.S., clouding the outlook for the future.

Against this economic backdrop, the Takuma Group expects to see continued demand for its principal businesses thanks to increased environmental awareness; progress in initiatives to prevent global warming and conserve resources and energy; planned replacement of, and updates to, outdated waste treatment facilities; and energy policies that are favorable for biomass power facilities, for example in the form of feed-in tariff programs for power.

During the consolidated fiscal year under review, we received orders for projects including construction of biomass power facilities and sewage sludge-fueled power generation facilities in addition to construction of waste treatment facilities, primary improvement work, and facility operation, maintenance, and management. As a result, order volume totaled 177,116 million yen. Although volume fell 13,910 million yen (7.3%) from the previous consolidated fiscal year, performance remained strong.

Sales rose 1,890 million yen (1.6%) from the previous consolidated fiscal year to 118,199 million yen on steady progress in construction projects such as waste treatment facilities and biomass power facilities. As a result, the backlog totaled 273,060 million yen.

Operating income was 10,030 million yen, ordinary profit was 10,670 million yen, and profit attributable to owners of parent was 7,847 million yen, down 944 million (8.6%), 936 million yen (8.1%), and 704 million yen (8.2%), respectively, from the previous consolidated fiscal year, when performance benefited from cost reductions.

Performance by segment was as follows:

(Millions of yen)

Segment	Orders received	Sales amount	Operating income	Backlog
Domestic Environment and Energy	148,892	90,075	10,488	262,388
Overseas Environment and Energy	3,873	3,401	78	2,783
Package Boiler	17,696	17,321	1,015	3,350
Equipment and System Business	7,141	7,697	229	4,770
Sub-total	177,603	118,494	11,810	273,292
Adjustment	(486)	(295)	(1,780)	(231)
Total	177,116	118,199	10,030	273,060

Financial Data

Consolidated Balance Sheets

TAKUMA CO., LTD. and Consolidated Subsidiaries
As of March 31, 2018 and 2017

	Millions of yen		Thousands of U.S. dollars
ASSETS	**2018**	2017	**2018**
Current assets:			
Cash and time deposits	**¥ 60,864**	¥ 57,719	**$ 572,888**
Notes and accounts receivable:			
Trade	**50,049**	44,716	**471,092**
Unconsolidated subsidiaries and affiliated companies	**380**	391	**3,578**
Other	**381**	242	**3,590**
Less allowance for doubtful accounts	**(38)**	(27)	**(358)**
Total	**50,772**	45,322	**477,902**
Inventories	**4,307**	3,897	**40,538**
Deferred tax assets	**1,669**	2,471	**15,708**
Other	**1,372**	766	**12,917**
Total current assets	**118,984**	110,175	**1,119,953**
Property, plant and equipment:			
Land	**3,011**	3,018	**28,344**
Buildings and structures	**12,287**	12,225	**115,647**
Machinery, equipment, lease assets and construction in progress	**10,653**	11,119	**100,275**
	25,951	26,362	**244,266**
Less accumulated depreciation	**(17,450)**	(17,434)	**(164,245)**
Total property, plant and equipment	**8,501**	8,928	**80,021**
Investments and other assets:			
Investment securities	**16,885**	13,161	**158,932**
Investments in:			
Unconsolidated subsidiaries and affiliated companies	**5,015**	4,950	**47,204**
Other	**1,823**	938	**17,155**
Less allowance for doubtful accounts	**(471)**	(461)	**(4,433)**
Total	**6,367**	5,427	**59,926**
Deferred tax assets	**785**	2,210	**7,388**
Other	**340**	300	**3,200**
Total investments and other assets	**24,377**	21,098	**229,446**
Total assets	**¥ 151,862**	¥ 140,201	**$ 1,429,420**

	Millions of yen		Thousands of U.S. dollars
LIABILITIES AND NET ASSETS	**2018**	2017	**2018**
Current liabilities:			
Short-term loans payable	**¥ 7,675**	¥ 7,675	**$ 72,242**
Current portion of long-term debt	**470**	468	**4,422**
Notes and accounts payable			
Trade	**34,913**	32,569	**328,625**
Unconsolidated subsidiaries and affiliated companies	**234**	344	**2,204**
Other	**979**	931	**9,214**
Total	**36,126**	33,844	**340,043**
Accrued income taxes	**281**	2,532	**2,644**
Advances received	**13,592**	7,935	**127,936**
Allowance for guarantees on completed work	**86**	177	**808**
Allowance for losses on sales contracts	**373**	3,578	**3,508**
Other	**5,709**	5,734	**53,741**
Total current liabilities	**64,312**	61,943	**605,344**
Long-term liabilities:			
Long-term debt	**459**	929	**4,319**
Allowance for directors' and executive officers' retirement benefits	**183**	152	**1,728**
Net defined benefit liability	**9,406**	9,011	**88,535**
Other	**776**	439	**7,301**
Total long-term liabilities	**10,824**	10,531	**101,883**
Total liabilities	**75,136**	72,474	**707,227**
Contingent liabilities			
Net assets:			
Common stock	**13,367**	13,367	**125,823**
Authorized: 321,840,000 shares			
Issued: 83,000,000 shares			
Capital surplus	**3,768**	3,768	**35,469**
Retained earnings	**52,949**	46,258	**498,386**
Treasury stock, at cost	**(235)**	(234)	**(2,214)**
331,385 shares in 2018 and 331,201 shares in 2017			
Total shareholders' equity	**69,849**	63,159	**657,464**
Unrealized gains on securities	**7,161**	4,886	**67,407**
Deferred gains and losses on hedges	**(46)**	(21)	**(438)**
Foreign currency translation adjustments	**2**	6	**22**
Remeasurements of defined benefit plans	**(559)**	(591)	**(5,265)**
Total accumulated other comprehensive income	**6,558**	4,280	**61,726**
Non-controlling interests in consolidated subsidiaries	**319**	288	**3,003**
Total net assets	**76,726**	67,727	**722,193**
Total liabilities and net assets	**¥ 151,862**	¥ 140,201	**$ 1,429,420**

Financial Data

TAKUMA CO., LTD. and Consolidated Subsidiaries
For the years ended March 31, 2018 and 2017

✚ Consolidated Statements of Operations

	Millions of yen		Thousands of U.S. dollars
	2018	2017	**2018**
Net sales	**¥ 118,199**	¥ 116,309	**$ 1,112,562**
Cost of sales	**93,372**	90,693	**878,877**
Gross profit	**24,827**	25,616	**233,685**
Selling, general and administrative expenses	**14,797**	14,642	**139,277**
Operating income	**10,030**	10,974	**94,408**
Other income (expenses):			
Interest and dividend income	**367**	337	**3,455**
Interest expense	**(66)**	(76)	**(621)**
Foreign currency exchange loss	**(157)**	-	**(1,478)**
Gain on sales of investment securities	**111**	-	**1,041**
Gain on liquidation of subsidiaries and associates	**90**	-	**850**
Loss on valuation of investment securities	**(60)**	-	**(565)**
Loss on disposal of property, plant and equipment	**(44)**	(51)	**(419)**
Equity in earnings of affiliated companies	**461**	280	**4,344**
Other, net	**79**	142	**744**
Other income (expenses), net	**781**	632	**7,351**
Income before income taxes	**10,811**	11,606	**101,759**
Income taxes:			
Current	**1,352**	2,859	**12,731**
Deferred	**1,581**	172	**14,879**
Total income taxes	**2,933**	3,031	**27,610**
Profit	**7,878**	8,575	**74,149**
Profit attributable to non-controlling interests in consolidated subsidiaries	**31**	24	**284**
Profit attributable to owners of parent	**¥ 7,847**	¥ 8,551	**$ 73,865**

	Yen		U.S. dollars
Per share:			
Net income	**¥ 94.93**	¥ 103.43	**$ 0.89**
Diluted net income	**-**	-	**-**
Cash dividends applicable to the year	**16.00**	13.00	**0.15**

✚ Consolidated Statements of Comprehensive Income

	Millions of yen		Thousands of U.S. dollars
	2018	2017	**2018**
Profit	**¥ 7,878**	¥8,575	**$74,149**
Other comprehensive income:			
Unrealized gains on securities	**2,275**	1,299	**21,420**
Deferred gains and losses on hedges	**(3)**	(29)	**(30)**
Foreign currency translation adjustments	**(4)**	23	**(36)**
Remeasurements of defined benefit plans	**31**	69	**294**
Total other comprehensive income	**2,299**	1,362	**21,648**
Comprehensive income	**¥ 10,177**	¥ 9,937	**$ 95,797**
Comprehensive income attributed to:			
Owners of the parent	**¥ 10,125**	¥ 9,942	**$ 95,306**
Non-controlling interests	**52**	(5)	**491**

✚ Consolidated Statements of Changes in Net Assets

	Common stock	Capital surplus	Retained earnings	Treasury stock, at cost	Total shareholders' equity	Unrealized gains on securities	Deferred gains and losses on hedges	Foreign currency translation adjustments	Remeasurements of defined benefit plans	Total accumulated other comprehensive income	Non-controlling interests in consolidated subsidiaries	Total net assets
For the years ended March 31, 2018	Millions of yen											
Balance at the beginning of current period	¥13,367	¥3,768	¥46,258	¥(234)	¥63,159	¥4,886	¥(21)	¥6	¥(591)	¥4,280	¥288	¥67,727
Cash dividends (¥14.00 per share)	-	-	(1,156)	-	(1,156)	-	-	-	-	-	-	(1,156)
Profit attributable to owners of parent	-	-	7,847	-	7,847	-	-	-	-	-	-	7,847
Purchase of treasury stock	-	-	-	(1)	(1)	-	-	-	-	-	-	(1)
Other changes during the year, net	-	-	-	-	-	2,275	(25)	(4)	32	2,278	31	2,309
Balance at the end of current period	¥13,367	¥3,768	¥52,949	¥(235)	¥69,849	¥7,161	¥(46)	¥2	¥(559)	¥6,558	¥319	¥76,726
For the years ended March 31, 2017	Millions of yen											
Balance at the beginning of current period	¥13,367	¥3,768	¥38,754	¥(232)	¥55,657	¥3,586	¥(27)	¥(11)	¥(660)	¥2,888	¥264	¥58,809
Cash dividends (¥12.00 per share)	-	-	(992)	-	(992)	-	-	-	-	-	-	(992)
Profit attributable to owners of parent	-	-	8,551	-	8,551	-	-	-	-	-	-	8,551
Change in scope of consolidation	-	-	(55)	-	(55)	-	-	-	-	-	-	(55)
Purchase of treasury stock	-	-	-	(2)	(2)	-	-	-	-	-	-	(2)
Other changes during the year, net	-	-	-	-	-	1,300	6	17	69	1,392	24	1,416
Balance at the end of current period	¥13,367	¥3,768	¥46,258	¥(234)	¥63,159	¥4,886	¥(21)	¥6	¥(591)	¥4,280	¥288	¥67,727
For the years ended March 31, 2018	Thousands of U.S. dollars											
Balance at the beginning of current period	$125,823	$35,469	$435,415	$(2,212)	$594,495	$45,987	$(196)	$53	$(5,559)	$40,285	$2,711	$637,491
Cash dividends ($0.13 per share)	-	-	(10,894)	-	(10,894)	-	-	-	-	-	-	(10,894)
Profit attributable to owners of parent	-	-	73,865	-	73,865	-	-	-	-	-	-	73,865
Purchase of treasury stock	-	-	-	(2)	(2)	-	-	-	-	-	-	(2)
Other changes during the year, net	-	-	-	-	-	21,420	(242)	(31)	294	21,441	292	21,733
Balance at the end of current period	$125,823	$35,469	$498,386	$(2,214)	$657,464	$67,407	$(438)	$22	$(5,265)	$61,726	$3,003	$722,193

✚ Consolidated Statements of Cash Flows

	Millions of yen		Thousands of U.S. dollars
	2018	2017	**2018**
Cash flows from operating activities:			
Income before income taxes	**¥ 10,811**	¥ 11,606	**$ 101,759**
Adjustments to reconcile income before income taxes to net cash provided by operating activities:			
Depreciation	**790**	851	**7,433**
Loss (gain) on sales of investment securities	**(111)**	0	**(1,041)**
Loss (gain) on liquidation of subsidiaries and associates	**(90)**	1	**(850)**
Loss (gain) on valuation of investment securities	**60**	-	**565**
Increase (decrease) in allowance for doubtful accounts	**20**	(18)	**191**
Increase (decrease) in allowance for bonuses	**307**	182	**2,892**
Increase (decrease) in allowance for losses on sales contracts	**(3,205)**	(1,586)	**(30,168)**
Increase (decrease) in net defined benefit liability	**441**	445	**4,152**
Interest and dividend income	**(367)**	(337)	**(3,455)**
Interest expense	**66**	76	**621**
Equity in losses (earnings) of affiliated companies	**(461)**	(280)	**(4,344)**
Net decrease (increase) in notes and accounts receivable and advances received	**200**	463	**1,884**
Decrease (increase) in inventories	**(387)**	148	**(3,640)**
Decrease (increase) in other current assets	**(305)**	(25)	**(2,875)**
Net increase (decrease) in notes and accounts payable and advance money	**1,959**	(2,143)	**18,438**
Increase (decrease) in other current liabilities	**(426)**	1,489	**(4,007)**
Other	**(798)**	148	**(7,506)**
Subtotal	**8,504**	11,020	**80,049**
Interest and dividend received	**456**	405	**4,293**
Interest paid	**(66)**	(76)	**(625)**
Income taxes received (paid)	**(3,753)**	(1,759)	**(35,329)**
Net cash provided by operating activities	**5,141**	9,590	**48,388**
Cash flows from investing activities:			
Net decrease (increase) in time deposits	**4**	3	**40**
Purchase of property, plant and equipment	**(343)**	(575)	**(3,231)**
Purchase of intangible fixed assets	**(125)**	(65)	**(1,174)**
Purchase of investment securities	**(561)**	(473)	**(5,277)**
Sale of investment securities	**230**	13	**2,161**
Disbursement for loans receivable	**(151)**	(171)	**(1,423)**
Collection of loans receivable	**550**	1,328	**5,175**
Other	**68**	83	**641**
Net cash provided by (used in) investing activities	**(328)**	143	**(3,088)**
Cash flows from financing activities:			
Net increase (decrease) in short-term bank loans	**-**	(75)	**-**
Payment of long-term debt	**(468)**	(673)	**(4,403)**
Purchase of treasury stock	**(1)**	(2)	**(2)**
Payment of cash dividends	**(1,157)**	(992)	**(10,894)**
Dividends paid to non-controlling interests	**(21)**	(17)	**(199)**
Other	**(23)**	(28)	**(222)**
Net cash used in financing activities	**(1,670)**	(1,787)	**(15,720)**
Effect of exchange rate changes on cash and cash equivalents	**8**	15	**78**
Net increase in cash and cash equivalents	**3,151**	7,961	**29,658**
Cash and cash equivalents at beginning of year	**57,132**	48,335	**537,767**
Increase in cash and cash equivalents from newly consolidated subsidiary	**-**	836	**-**
Cash and cash equivalents at end of year	**¥ 60,283**	¥ 57,132	**$ 567,425**

Outside Expert Opinion

✚ Outside Expert Opinion

Kazuhiko Takano
Professor, Ph.D. in Law (LL.D.)
Graduate School and Faculty of Safety Science, Kansai University
Senior Director
Japan Society for Business Ethics Study
Senior Researcher
Business Ethics Research Center

1. Features of the Takuma Group's approach to CSR management

I believe that the Takuma Group's business plays an important role in supporting Japanese industry, particularly with regard to a wide variety of plants, and there is strong need on the part of society for the company to continue to operate. I conduct research into CSR as a specialist in the various management structures that provide a basis for corporate sustainability, including corporate governance, risk management, and compliance. I reviewed the Takuma CSR Report 2018 from that perspective, and I'd like to introduce some of its features as I see them.

The first feature is corporate governance. At its regular general meeting of shareholders in June 2016, the company transitioned to a corporate structure with an auditing committee, an organization that was newly established in the revised Companies Act, and it acted voluntarily to establish a Human Resources & Remuneration Advisory Committee. This decision was a pioneering one that was presumably intended as an institutional design change to enhance the oversight function of the Board of Directors and to facilitate free and vigorous discussion.

The second feature is compliance structures. Takuma has established a Compliance & CSR Promotion Organization, and the Group as a whole practices the PDCA cycle for managing major risks. Members of the organization are responsible for education and awareness-raising in their respective departments, and they report regularly back to the division on the progress of those efforts. On the Group level, the Takuma Group Coordinating Committee for Compliance & CSR Promotion facilitates awareness-raising activities such as employee education. It is apparent that the committee has identified issues such as the Antimonopoly Act, export control, and harassment as significant risks, and that it's working to spread awareness through frequent employee education programs.

The third feature is the cycle used to assess the extent to which compliance and CSR awareness have spread throughout the organization and to improve that level of penetration. Takuma began conducting a CSR Awareness Survey in 2008, and it expanded the scope of the survey to include Group companies in 2013. By quantitatively assessing the penetration of compliance and CSR education year by year, the company is working to improve associated measures.

I believe that the Takuma Group's CSR activities are distinguished by extensive employee education and communication. I also believe that companies can address most of the risks they face by improving employee awareness and cultivating an organizational culture that is characterized by free and open communication. Going forward, I hope to see Takuma continue activities such as these.

2. Areas where Takuma can do more

Currently, experts are predicting composite natural disasters with far-reaching regional consequences such as a Nankai megathrust earthquake. The Takuma Group has formulated a business continuity plan (BCP) to address the risks posed by such events. I believe that the effectiveness of the BCP can be enhanced if the company conducts regular crisis simulation training going forward in which it practices implementing its BCP and makes improvements to those aspects of the plan that prove problematic.

In addition, the Takuma Group's 12th Medium-Term Management Plan calls for the company to actively develop its businesses overseas. Global companies must take on significant risks due to high civil penalties and fines often levied overseas in areas such as data protection, bribery prohibition, and antitrust law as well as legal systems that apply across borders. By adding these topics to its already extensive employee education programs, I believe Takuma will be able to develop into an organization that is even more capable of developing its businesses in the future.

I believe that the Takuma Group is currently implementing a sophisticated program of compliance and CSR activities. Going forward, I expect to see the Group enhance its sustainability so that it can develop even further by exploring how to adjust its compliance and CSR activities to its expanding businesses and social changes.

✚ Response to the Outside Expert Opinion

Koji Tanaka
Director & Executive Officer
Executive Manager
Compliance &
CSR Promotion Division &
Corporate Service Division

I would like to thank Professor Takano of Kansai University for offering his valuable insights on the CSR Report 2018.

In compiling this report, we have worked to offer stakeholders an easy-to-understand introduction to a variety of activities carried out by the Takuma Group with the goal of resolving social issues and increasing corporate value by achieving sustained growth as well as to the Group's 12th Medium-Term Management Plan, which began this year, and we have focused on inviting involved parties to express their thoughts on related subjects in their own words.

I'd like to express our gratitude to Professor Takano for his evaluation of the Group's CSR management initiatives in "1. Features of the Takuma Group's approach to CSR management." An old expression says that it takes a decade to build a castle, but only one day to destroy it. In that spirit, there is no shortage of scandals that threaten to undermine the trust that organizations have built up over time. Corporate governance, risk management, and compliance together provide a foundation for management that is a prerequisite for robust corporate activities. Going forward, we will pursue initiatives in these areas with a sense of urgency both to live up to stakeholders' expectations and requirements and to achieve sustainable growth for the Group.

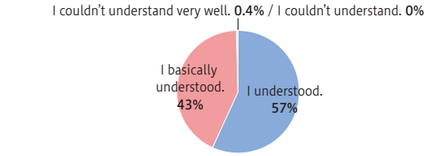
Professor Takano also offered valuable insights with regard to enhancing the business continuity plan (BCP) and addressing significant risks in our global businesses in "2. Areas where Takuma can do more." We will strive to build tenacious business and management foundations that can withstand future environmental changes while cultivating an ESG- and SDG-driven perspective.

We value Professor Takano's observations and take them seriously, and I would request stakeholders' continued support and encouragement as we work to practice CSR management and enhance our CSR Report.

Takuma Corporate Profile & CSR Report 2017 Questionnaire Survey Results

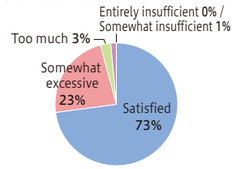
Survey period: July 2017 to June 2018
Number of respondents: 961

Q1 Did you understand the activities of our company?

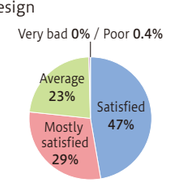


Q2 What is your level of satisfaction regarding this Report?

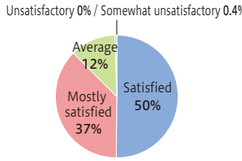
(1) Volume of information



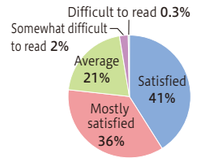
(2) Design



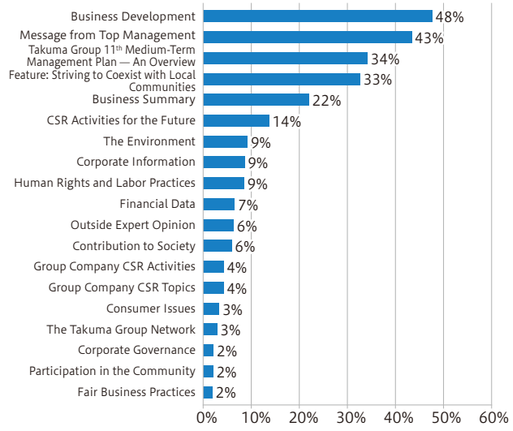
(3) Quality of information



(4) Readability



Q3 Which items were you interested in? (Select up to 3.)



● Editorial Policy
We have prepared this document as a CSR Report that details our CSR activities.

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● Data Collection Period
From April 1, 2017, to March 31, 2018, in principle.
In addition, some activities in FY2018 are included.

● Coverage
This report applies to Takuma Co., Ltd. and its affiliates in principle.

● Time of Issue
Current issue: July 2018
Next issue: Scheduled for July 2019
Last issue: July 2017

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